Table of Contents

List of Figures

List of Tables

3 Affected Environment / Environmental Consequences

This chapter summarizes the affected environment and environmental consequences associated with the Proposed Refinements. Each resource area was assessed to determine if the Proposed Refinements would result in a change in effects to the resource when compared to the effects disclosed in the 2016 Amended ROD for the Previous Design. Unless otherwise noted, the methods used to determine impacts are the same as those used to assess the Previous Design.

The fundamental purpose of this Supplemental EA is to determine whether any significant impacts would result from the Proposed Refinements. The definition of "significance" at 40 CFR 1508.27 was applied to each impact noted for each of the affected resources. Accordingly, FTA and GoTriangle considered both the context and intensity of the impacts when evaluating significance. This Supplemental EA considers context for each anticipated impact by evaluating whether the environments affected by the Proposed Refinements differ from the affected environments evaluated in the NEPA documentation for the Previous Design. The Supplemental EA then considers the relevant aspects of intensity of project impacts for each resource in the evaluation of environmental consequences of the Proposed Refinements relative to the Previous Design.

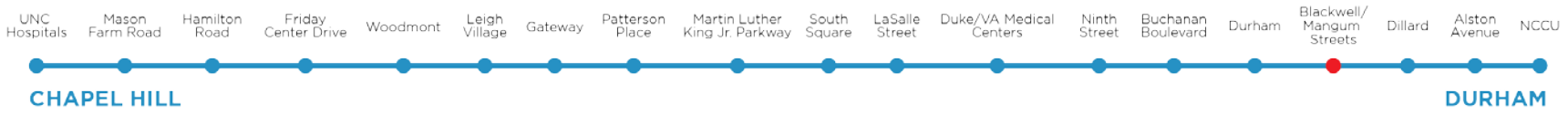
This chapter focuses on resources anticipated to be affected by the Proposed Refinements. Where no effects are anticipated, the resource is not discussed in

this chapter. See **appendix B** for a summary of the resource categories not anticipated to be affected by the Proposed Refinements, which include:

- Freight and passenger railroads
- Airports
- Air quality
- Socioeconomic and demographic conditions

Each section in this chapter is organized as follows:

- **Affected Environment –** A summary of the existing conditions in the Proposed Refinements study area
- **Environmental Consequences –** A summary of the direct impact findings for each of the resource areas as a result of implementation of the Proposed Refinements
- **Mitigation Measures –** The measures that would be implemented to avoid, minimize, or mitigate impacts of the Proposed Refinements



3.1 Transportation

This section presents the existing conditions of transportation resources, potential impacts of the Proposed Refinements, and proposed mitigation measures. Additional detail is available in **appendix C**. The following topics are discussed in this section:

- Public transportation
- Roadways
- Parking
- Pedestrian and bicycle facilities

The methodologies for assessing transportation impacts used in the NEPA documentation for the Previous Design were also used to assess the transportation impacts of the Proposed Refinements. The future travel demand estimates used in the analysis of the Proposed Refinements are derived from the same 2040 (horizon year) projections of population, employment, and roadway/transit capacity used in the NEPA documentation for the Previous Design.

In March 2018, the Durham-Chapel Hill-Carrboro Metropolitan Planning Organization (DCHC MPO) adopted an updated Metropolitan Transportation Plan (MTP). The updated MTP is the official long-range transportation plan for the region and includes all transportation projects estimated to be funded by 2045.

Although the horizon year for assessing impacts remains 2040, FTA compared the 2045 MTP to the 2040 MTP to identify any new projects that could change any of the projections or conclusions about transportation impacts of the Proposed Refinements.

The 2045 MTP has one additional transportation project within the study area as compared to the 2040 MTP: the extension of Danziger Drive across I-40 between the Patterson Place and Gateway station areas. The Danziger Drive extension would provide new capacity for local access and circulation and could result in lower traffic volumes on McFarland Drive and Old Chapel Hill Road than were projected for 2040.

3.1.1 Public Transportation

This section assesses the potential public transportation impacts associated with the Proposed Refinements.

3.1.1.1 Affected Environment

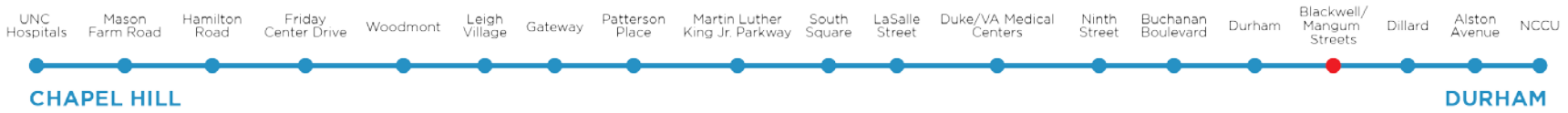
The NEPA documentation for the Previous Design described the existing and planned public transportation services within the D-O Corridor. These services have not changed since the previous NEPA documentation.

3.1.1.2 Environmental Consequences

The Proposed Refinements would result in similar access to transit facilities compared to the Previous Design. Under the Proposed Refinements, no stations would be eliminated; however, several stations, including the UNC Hospitals, Patterson Place, Gateway, and Martin Luther King Jr. Parkway stations, would be shifted slightly to improve visibility and access to the stations (see **Figures 2-2 and 2-28**). Additionally, the Proposed Refinements would add a station in downtown Durham at Blackwell/Mangum Streets (see **Figure 2-24**), and improvements would be made to bicycle and pedestrian accessibility along the alignment.

In light of the analysis in this Supplemental EA, considering the context and intensity of impacts, and considering all impacts already evaluated and disclosed for public transportation in the previous NEPA documents, FTA does not anticipate there will be any new significant impacts to public transportation associated with the Proposed Refinements.

Impacts to bus connections, the proposed service plan, travel times, and ridership forecasts are discussed in detail below.



Bus Connections

The Proposed Refinements would include modifications to the roadway network that affect the existing access and mobility for some bus services. In some locations, the roadway modifications would result in minor increases in bus travel time, while in other locations, the roadway modifications would result in minor savings in bus travel time. Relative to the Previous Design, the overall effects on bus service are not anticipated to be significant. Section 3.1.2 describes proposed changes to roadways that would affect traffic and result in effects on bus services.

As with the Previous Design, it is anticipated that construction will result in temporary changes in access and mobility; roadway connections may be temporarily affected and bus routes will need to be re-routed to adjacent roads. Construction impacts are discussed in more detail in section 3.15.

Proposed Service Plan

The Proposed Refinements would not change the light rail service plan relative to the Previous Design.

Travel Times

The Proposed Refinements include adjustments to the track alignment, in particular at Gateway Station, Patterson Place Station, and Martin Luther King Jr. Parkway Station. In addition, the refinements include a new proposed station at Blackwell and Mangum Streets. These refinements would affect the total travel time. A new travel time was calculated to account for these new conditions. Whereas travel time between UNC Hospitals and NCCU Station under the Previous Design is projected to be 44-46 minutes, the travel time with the Proposed Refinements is estimated at 52-54 minutes. Additional detail on travel time information is available in the following section on ridership forecasts and in **appendices C-1** and **C-4**.

Ridership Forecasts

The daily ridership for the D-O LRT Project with the Proposed Refinements is forecasted to be 23,940, or 2,940 fewer trips than the daily ridership forecasted for the Previous Design (see **appendix C-1**).

Table 3-1 summarizes the daily ridership forecasts, showing boardings and deboardings by station, including the boardings and deboardings at the proposed Blackwell/ Mangum Streets Station. **Figure 3-1** shows daily ridership by trip purpose (i.e., the reason the traveler is traveling; this is how trips are categorized during travel forecasting) and **Figure 3-2** shows daily ridership by access mode (i.e., the means by which the traveler arrived at the light rail station).

The ridership change from the Previous Design is the result of changes in travel time, modifications to the travel model assumptions, and a reduction in park-and-ride spaces along the alignment with the Proposed Refinements.

Travel Time

With the Proposed Refinements, end-to-end travel time along the alignment increases to 52-54 minutes, as compared to 44-46 minutes under the Previous Design. The increase in travel time is the result of several factors:

- **The Addition of a Station at Blackwell Street and Mangum Street:** With this refinement, light rail vehicles would be operated at lower speeds between Durham Station and Dillard Street Station to make the additional stop, which increases travel time.

  The additional station would improve access to employment, entertainment, and housing destinations within the Downtown Durham central business district core and the American Tobacco Campus warehouse district.

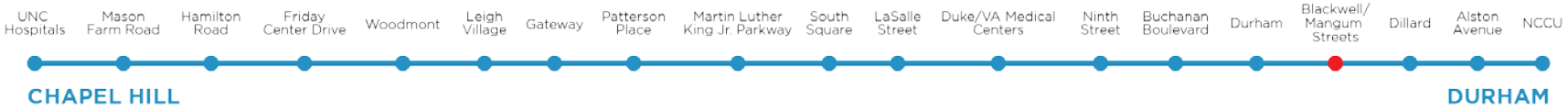
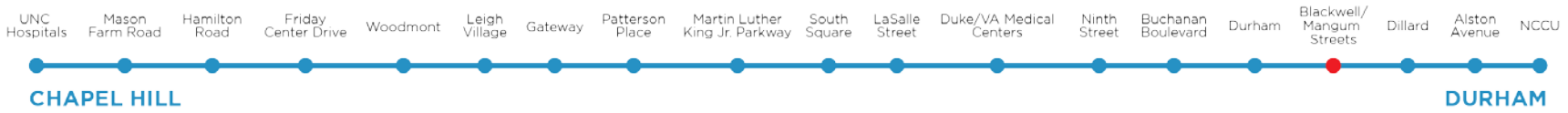
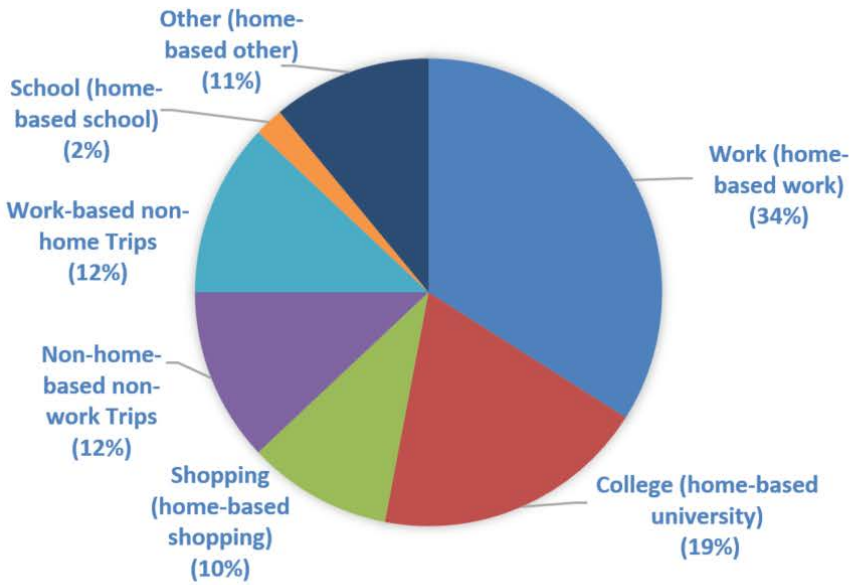


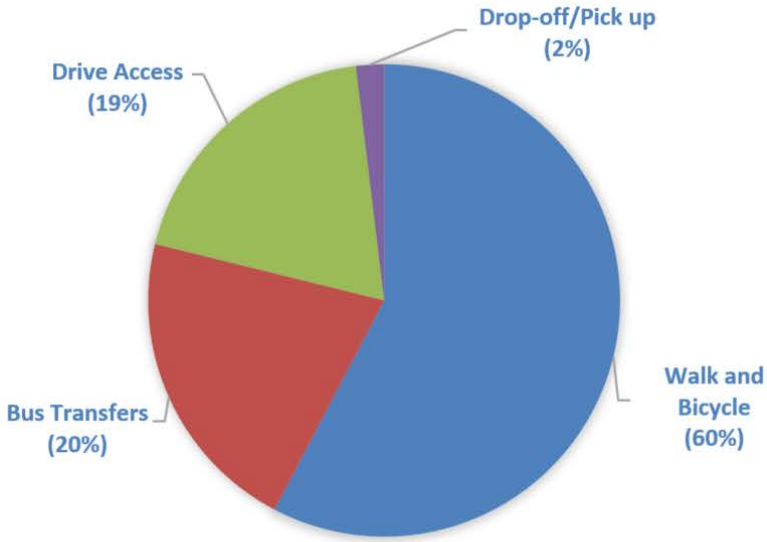
Table 3-1: 2040 Daily Ridership Forecasts by Station with Proposed Refinements

Station	Eastbound		Westbound	
	UNC-NCCU Boardings	UNC-NCCU Deboardings	NCCU-UNC Boardings	NCCU-UNC Deboardings
UNC Hospitals	2,780	0	0	2,780
Mason Farm Road	820	50	50	820
Hamilton Road	190	80	80	190
Friday Center Drive	600	950	950	600
Woodmont	280	310	310	280
Leigh Village	750	1,460	1,460	750
Gateway	630	640	640	630
Patterson Place	490	470	470	490
Martin Luther King Jr. Parkway	440	580	580	440
South Square	1,210	290	290	1,210
LaSalle Street	340	700	700	340
Duke/VA Medical Centers	1,630	820	820	1,630
Ninth Street	440	410	410	440
Buchanan Boulevard	230	310	310	230
Durham	390	1,320	1,320	390
Blackwell/Mangum Streets *(new)*	280	920	920	280
Dillard Street	100	340	340	100
Alston Avenue	370	680	680	370
NCCU	0	1,640	1,640	0
TOTAL	11,970	11,970	11,970	11,970

Source: appendix C-1, Travel Demand Methodology and Results Report
Note: Rounding was used and may lead to discrepancy in totals.
Note: Average weekday ridership estimates.



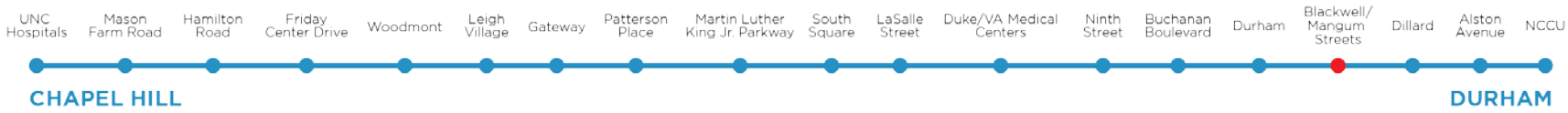




Source: appendix C-1, Travel Demand Methodology and Results Report
Note: Home-based trips are trips where the home of the trip maker is either the origin or destination of the trip, whereas non-home-based trips are trips that neither begin nor end at the home.
Note: Total does not equal 100% due to rounding.

Figure 3-1: 2040 Total Daily Light Rail Trips – By Purpose

Figure 3-2: 2040 Total Daily Light Rail Trips – By Mode of Access Share



The increase in travel time associated with the addition of a station at Blackwell Street and Mangum Street, when added to the other Proposed Refinements, results in an overall increase in the total travel time along the alignment. The mobility benefits of increased access to transit offsets this travel time increase.

- **Advancement of the Track Alignment and Engineering Design:** In the NEPA documentation for the Previous Design, travel time was calculated using conceptual track alignment and engineering designs. Since that time, the engineering design has progressed, providing more detailed information on the location and curvature of the track (i.e., track geometry). The additional detail provided better accuracy in the travel time calculation resulting in increased end-to-end travel time.
- **A More Detailed Analysis of Light Rail Operations:** The Proposed Refinements include updates to Previous Design assumptions of the travel speeds, light rail vehicle configuration, dwell times, track configuration, and signal operation. These updates were made based on a more detailed analysis of light rail operations. The Proposed Refinements affect the operating conditions and maximum speeds feasible along different segments of the alignment. The updates contributed to an increase in the end-to-end travel time for the Proposed Refinements.

Modifications to Travel Model Assumptions

Following issuance of the Amended ROD, FTA and GoTriangle modified several assumptions in the travel-demand model used for ridership modeling, known as the Triangle Regional Model version 5r (abbreviated to TRM v5r). These modified assumptions were then incorporated into the updated ridership forecasts prepared for this Supplemental EA. **Appendix C-1** provides more detail pertaining to the assumptions in the travel-demand model and why they were modified for this Supplemental EA.

Reduction in Park-and-Ride Spaces

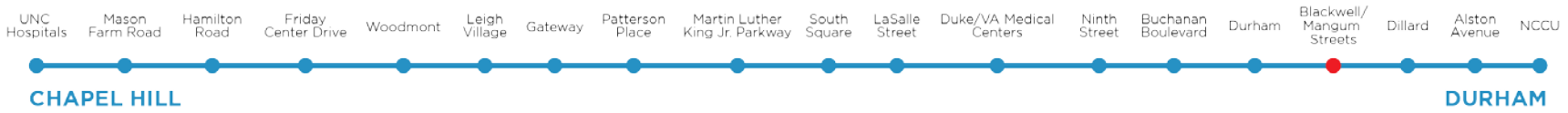
The Proposed Refinements would provide fewer park-and-ride spaces relative to the Previous Design (see section 3.1.3).

The Proposed Refinements would change the configuration of the Martin Luther King Jr Parkway Station park-and-ride lot. The change would reduce the number of available spaces from 500 spaces to approximately 138 spaces.

The Previous Design included a park-and-ride lot adjacent to the Dillard Street Station. However, subsequent to the development of the Previous Design, the proposed site of the park-and-ride lot has been redeveloped with 305 apartment units, and additional development is proposed on the remainder of the site, leaving no space for transit parking. This development very close to the station will help offset the loss of park-and-ride capacity.

In addition, the Proposed Refinements would change the configuration of the park-and-ride parking at the Alston Avenue Station from a structured garage to surface parking. The change in the parking configuration at Alston Avenue Station would reduce the parking supply from 980 to 720 spaces.

The reduction in planned parking supply would affect both ridership and parking demand along the alignment. As a result, the travel model was adjusted to reflect the lower parking demand. See **appendix C-1,** Travel Demand Methodology and Results Report.



3.1.1.3 Mitigation Measures

As with the Previous Design, it is anticipated that minor adjustments in bus routing will be necessary due to shifts in station locations and modifications to the roadway network. Prior to revenue service, GoTriangle will work with service planning staff from GoTriangle, Chapel Hill Transit, and GoDurham to develop and implement a plan to integrate bus and rail service within the corridor. As part of the process, the transit providers will engage the public and complete a Transit Service and Fare Equity Analysis.

3.1.2 Roadways

This section summarizes projected 2040 traffic conditions for intersections that could be affected by the Proposed Refinements. Complete traffic analysis results can be found in the D-O LRT Proposed Refinements Traffic Analysis Technical Report (**appendix C-2**). Additional roadway improvements are described in chapter 2. Except as described below, these improvements do not change the interaction between light rail trains and the roadway network.

3.1.2.1 Affected Environment

The roadways and intersections that would be affected by the Proposed Refinements remain the same as those identified in the NEPA documentation for the Previous Design.

The study area has been expanded in the Downtown Durham area to include the Ramseur Street intersections with Chapel Hill Street and Dillard Street in order to account for operational changes on Ramseur Street. The purpose of this expanded study area is to evaluate a Proposed Refinement that would allow bus traffic to and from the Durham Station Transportation Center (Durham Bus Station).

3.1.2.2 Environmental Consequences

The Proposed Refinements would affect traffic in the following three segments of the study area:

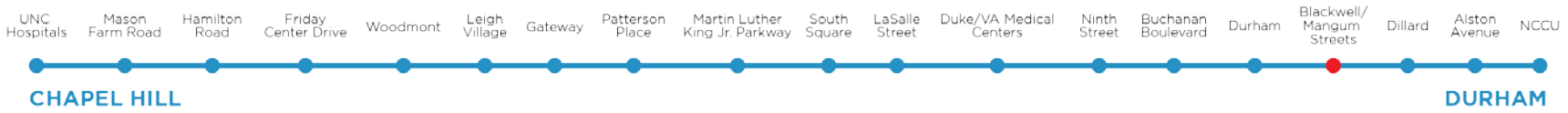
- University Drive
- Erwin Road (Cameron Boulevard to Towerview Road)
- Downtown Durham

The Proposed Refinements outside these areas are not expected to affect traffic operations.

What Is Level of Service (Figure 3-3)?

- A qualitative measure used to describe the quality of traffic service. LOS is used to analyze highways and intersections by categorizing traffic flow and assigning quality grades based on performance measures like speed, delay, and density.
- **Delay is** the additional travel time experienced by a driver, passenger, or pedestrian, usually reported in seconds.

Table 3-2 presents the Level of Service (LOS) at 21 key intersections in the affected roadway segments for the morning (AM) and afternoon (PM) peak hours. The LOS is presented for the Previous Design and the Proposed Refinements. Impacts of the Proposed Refinements as compared to the Previous Design are indicated with shading, either green (beneficial) or red (adverse). Significant adverse impacts of the Previous Design are indicated with bold italic text. None of the adverse impacts of the Proposed Refinements are significant.



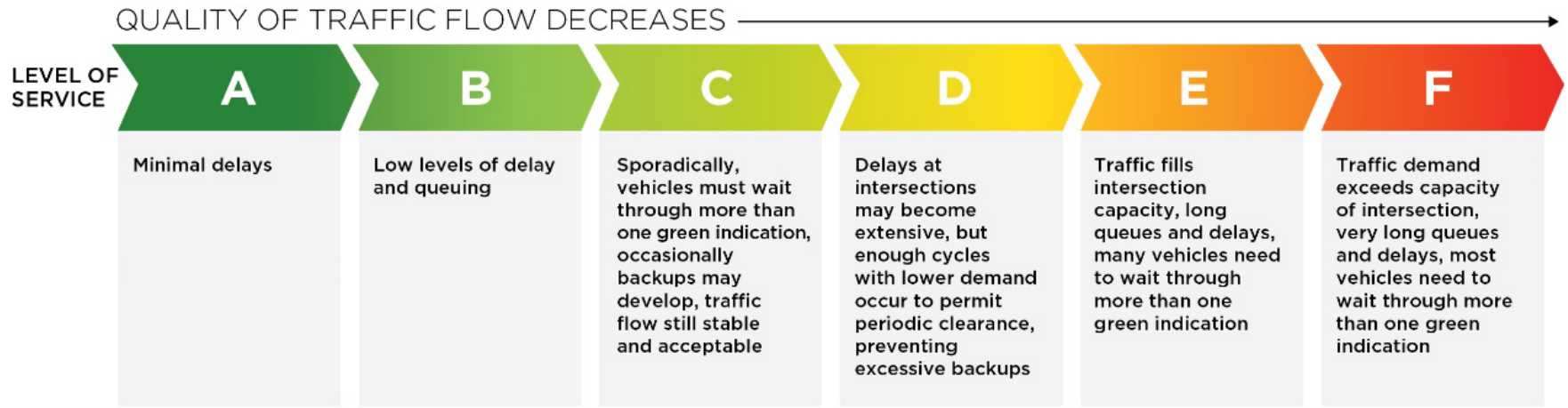


Figure 3-3: Level of Service Descriptions

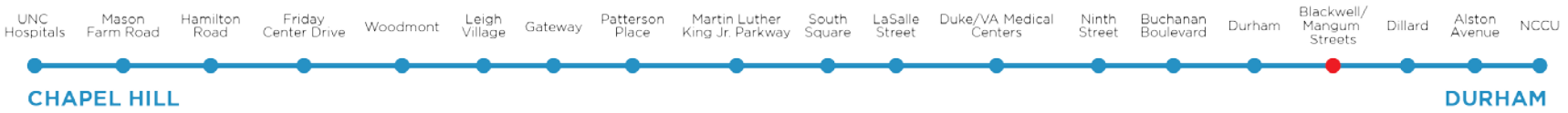
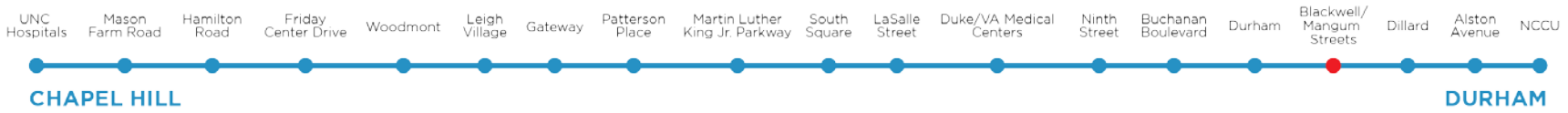


Table 3-2: 2040 Overall Intersection LOS

Segment	Intersection	AM Peak Hour: LOS (Delay in seconds)		PM Peak Hour: LOS (Delay in seconds)	
		Previous Design	Project with Proposed Refinements	Previous Design	Project with Proposed Refinements
University Drive	at Snow Crest Trail/Ivy Creek Boulevard	C (29.9)	A (8.9)	C (27.0)	D (49.7)
	at Larchmont Road	*F (57.6)**	C (24.0)	*F (55.6)**	E (64.2)
	at Martin Luther King Jr. Parkway	*E (61.0)*	D (52.0)	E (60.1)	E (70.4)
	at Westgate Drive	D (37.9)	C (33.0)	E (57.5)	E (67.7)
	at BB&T Plaza Drive	N/A	A (8.6)	N/A	E (55.1)
Erwin Road	at Cameron Boulevard	C (25.4)	C (22.1)	D (42.0)	C (33.4)
	at Towerview Road/ Morreene Road	D (46.4)	D (37.8)	E (70.1)	D (47.9)
Downtown Durham	W. Chapel Hill Street and Duke Street	C (27.5)	C (25.0)	C (32.4)	C (28.2)
	W. Chapel Hill Street and Pettigrew Street	B (13.4)	B (10.4)	C (25.8)	B (15.1)
	W. Chapel Hill Street and Ramseur Street	N/A	C (26.1)	N/A	C (27.7)
	Pettigrew Street and Blackwell Street	B (15.3)	D (28.4)*	B (14.3)	C (19.5)*
	Ramseur Street and Blackwell/Corcoran Streets	B (12.4)	B (18.7)	B (12.5)	B (18.3)
	Main Street and Corcoran Street	B (15.4)	D (41.4)	C (22.9)	C (28.4)
	Pettigrew Street and Mangum Street	A (4.6)	B (13.5)	A (2.7)	B (11.4)
	Ramseur Street and Mangum Street	C (26.8)	C (22.7)	C (34.9)	C (23.4)
	Main Street and Mangum Street	D (35.7)	D (40.1)	*E (76.3)*	D (53.3)
	Pettigrew Street and Roxboro Street	B (16.3)	B (19.8)	B (18.7)	B (18.8)
	Ramseur Street and Roxboro Street	N/A	A (3.0)*	N/A	A (3.4)*
	Pettigrew Street and Dillard Street	B (18.3)	B (16.9)	C (22.3)	B (18.7)
	Ramseur Street and Dillard Street	N/A	C (15.3)	N/A	D (26.5)
	Pettigrew Street and Fayetteville Street	C (28.9)	D (37.6)	D (39.7)	D (50.9)
	Pettigrew Street and Grant Street	B (15.2)	B (15.6)	B (18.7)	C (28.9)

Notes: See Figure 3-3 for LOS descriptions.
N/A - Intersection was not analyzed for this scenario.
* One-way stop intersection LOS is reported for movement with lowest LOS.



The Proposed Refinements would eliminate all four of the significant adverse LOS impacts identified for the Previous Design. Relative to the Previous Design, the Proposed Refinements would result in better overall 2040 peak hour intersection LOS at the intersections included in the study.

University Drive

The Proposed Refinements would shift the light rail alignment from median-running to side-running along University Drive between the intersection of Snow Crest Trail/Ivy Creek Boulevard to the west and the Shannon Road/ University Drive intersection to the east. The Martin Luther King Jr. Parkway Station also would shift from the median to the south side of University Drive just east of Martin Luther King Jr. Parkway, with pedestrian access from each end (Martin Luther King Jr. Parkway and Lyckan Parkway intersections).

The Proposed Refinements include new traffic signals at the Larchmont Road/University Drive and BB&T Plaza Drive/University Drive intersections. The Larchmont signal replaces the need for a Larchmont connector road (Amended ROD Mitigation Commitment #NCR02). The Proposed Refinements also include an underpass below the Shannon Road/University Avenue intersection.

The Proposed Refinements result in intersection LOS improvements compared to the Previous Design at nearly every intersection in this corridor.

Erwin Road

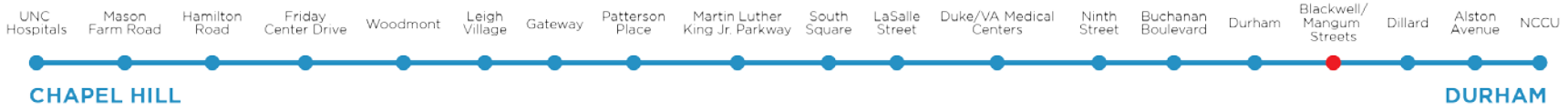
The Proposed Refinements would shift the light rail alignment in this segment from median-running at-grade to side-running at-grade along the east side of Erwin Road between the intersections at Cameron Boulevard and Towerview Road/Morreene Road. The Previous Design required installation of a new signal to serve the Duke University Center for Living, approximately 500 feet northeast of Cameron Boulevard; however, that signal would no longer be needed with the alignment shift. East of the Towerview Road/Morreene Road intersection, the proposed side-running at-grade light rail alignment would transition onto an elevated structure. East of LaSalle Street, the alignment transitions to median-running on an elevated structure.

The Erwin Road intersections east of Towerview Road/Morreene Road were not subject to new traffic analyses because, with no light rail interaction and very minor physical changes to the roadway, the Proposed Refinements would result in 2040 traffic conditions similar to those expected to result with the No Build Alternative evaluated in the NEPA documentation for the Previous Design.

Downtown Durham

As part of the engineering design, GoTriangle reviewed the roadway configurations relative to existing and planned rail crossings in detail. The relationship of the Blackwell Street/Corcoran Street crossing of the NCRR rail line to the proposed light rail line created potential safety concerns at that location, in terms of both the roadway slope and the timing of traffic signals. GoTriangle first examined raising Pettigrew Street starting at Blackwell Street to accommodate vehicles for a safer crossing of both the NCRR rail and the light rail. However, raising Pettigrew Street at this location would require the addition of several large retaining walls, which would adversely affect historic resources in the vicinity, including W.T. Blackwell and Co. (Bull Durham) Tobacco Factory, a National Historic Landmark.

To avoid the retaining walls in front of the W.T. Blackwell and Co. (Bull Durham) Tobacco Factory, GoTriangle proposes to close Blackwell Street to vehicle, pedestrian, and bicycle access between Ramseur Street and Pettigrew Street. The intersections of Blackwell Street/Pettigrew Street and Ramseur Street/Corcoran Street would become T-intersections on each side of the NCRR tracks and Pettigrew Street would begin to be raised east of the Blackwell/Mangum Streets Station.



Closure of Blackwell Street would improve the safety of pedestrians, bicyclists, and motorists and would avoid adverse effects to historic resources along Pettigrew Street.

GoTriangle recognizes that this roadway closure would result in changes to the existing access and mobility for vehicles, buses, pedestrians, and bicycles. GoTriangle is committed to providing safer pedestrian, bicyclists, and vehicular crossings in the corridor. Pedestrian and bicycle traffic would be routed over a signature civic space that would span Pettigrew Street, the light rail tracks, the NCRR tracks, and Ramseur Street. The signature civic space would be located approximately mid-block between Blackwell and Mangum streets. See section 3.3 Neighborhoods and Communities for additional information of the changes in access and mobility in this area.

The Previous Design required transit buses to operate in the westbound light rail alignment from Dillard Street west to the Durham Bus Station at E. Chapel Hill Street. The Proposed Refinements would convert Ramseur Street to a two-way street (see **appendix A-3, Sheet 29-30**). Buses currently using Corcoran/Blackwell Street to access Durham Station would use the converted two-way Ramseur Street and Chapel Hill Street to access the Durham Bus Station. This re-routing may result in a small increase in travel time; however this change is not anticipated to be significant when compared to the effects of the Previous Design.

In addition, Dillard Street would be converted to one-way southbound only at the NCRR crossing (see **appendix A-3, Sheet 30**). No buses currently use Dillard Street.

3.1.2.3 Mitigation Measures

This Supplemental EA documents the additional intersection analyses conducted by GoTriangle to meet Mitigation Commitment #R01 of the Amended ROD (see the Traffic Analysis Technical report included in **appendix C-2**). The additional traffic studies included in Mitigation Commitments #R02 and #R06 have been completed, and their results have been incorporated into the Proposed Refinements. No new mitigation measures are needed to reduce traffic impacts. GoTriangle will continue to work with transit agencies to ensure continued access to bus routes both during construction and with the proposed roadway modifications. As described in section 3.1.1.3., as part of the process, the transit providers will engage the public and complete a Transit Service and Fare Equity Analysis.

3.1.3 Parking

This section describes the potential direct, physical impacts to existing parking facilities anticipated to result from the Proposed Refinements. It does not include impacts to existing parking facilities associated with acquisitions. Acquisition impacts are described in section 3.13.

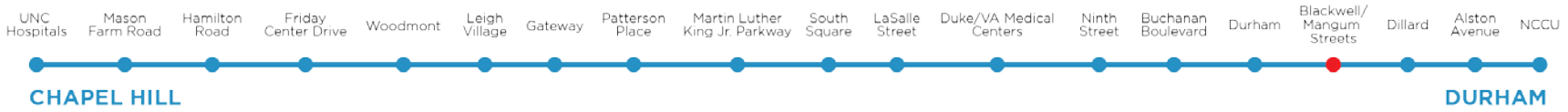
3.1.3.1 Affected Environment

The affected environment for the Proposed Refinements includes the available on-street parking and off-street parking for businesses described in the NEPA documentation for the Previous Design. In addition, this Supplemental EA includes an expanded study area along Ramseur Street to account for the available on-street parking facilities potentially affected by the Proposed Refinements in that area.

3.1.3.2 Environmental Consequences

The Proposed Refinements include reconfiguration of roadways and station areas that require changes to parking configurations throughout the corridor, including changes to on-street parking spaces and park-and-ride facilities.

The Proposed Refinements would remove approximately 55 on-street parking spaces in addition to the on-street parking spaces removed under the Previous Design. Changing Ramseur Street to a two-way street would remove approximately 39 on-street parking spaces along Ramseur Street and



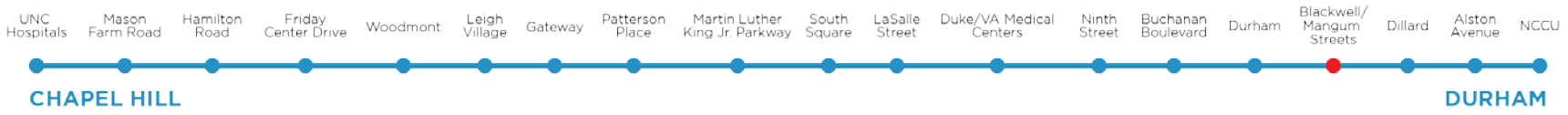
changes along Alston Avenue would remove approximately 16 on-street parking spaces along Linwood Avenue, Massey Avenue, Cox Avenue, and Dupree Street.

Table 3-3 summarizes the changes to the proposed park-and-ride lots at the light rail stations, comparing the Previous Design with Proposed Refinements.

Table 3-3: Parking Spaces at Station Park-and-Ride Lots

Station	Previous Design	Project with Proposed Refinements	What Changed?
Friday Center Drive	860	860[1]	Existing UNC parking lot remains, but not as a dedicated park-and-ride facility. Parking lot may be used by permitted users or by the public parking during after hour events.
Leigh Village	990	990	No changes.
Gateway	470	683	Reconfigured park-and-ride layout to accommodate additional spaces.
Martin Luther King Jr. Parkway	500	138	Reconfigured park-and-ride layout to avoid acquisition of "big box" commercial property.
South Square	250	600	Added spaces on portions of parcels identified as acquisitions in Previous Design.
Durham	150	150	No changes.
Dillard Street	950	0	Private development was built on previously identified proposed parking lot; park-and-ride removed from project design.
Alston Avenue	980	720	Changed from deck parking to two surface parking lots.

[1] Under the Previous Design, the existing 860 parking spaces would be dedicated park-and-ride spaces for the proposed Friday Center Drive Station. Under the Proposed Refinements, the existing 860 parking spaces would still be available to permitted users and for the public during after hour events.



In light of the analysis in this Supplemental EA, considering the context and intensity of impacts, and considering all impacts already evaluated and disclosed for parking in the previous NEPA documents, FTA does not anticipate there will be any new significant impacts to parking associated with the Proposed Refinements.

3.1.3.3 Mitigation Measures

The Proposed Refinements would not result in parking impacts that would require additional mitigation commitments beyond those included in the Amended ROD.

3.1.4 Pedestrian and Bicycle Facilities

The Proposed Refinements include bicycle and pedestrian facility improvements throughout the project corridor. This section describes pedestrian and bicycle facilities planned by partner agencies (including city and county governments) in the D-O Corridor, as well as the pedestrian and bicycle facilities proposed by GoTriangle to improve access between the light rail stations and surrounding land uses. The pedestrian and bicycle facilities included in the Proposed Refinements were added to address mitigation commitments from the Amended ROD. This section also addresses changes to pedestrian and bicycle connections that would result from the Proposed Refinements.

3.1.4.1 Affected Environment

The NEPA documentation for the Previous Design described existing and planned pedestrian and bicycle infrastructure within the D-O Corridor. These remain in the D-O LRT Project area. Additional planned projects by partner agencies, identified in adopted plans since the NEPA documentation for the Previous Design was issued, are summarized in **appendix C-3**, Bicycle and Pedestrian Facilities Report. These facilities include pedestrian sidewalks, bicycle facilities, and multi-use paths identified in the following plans:

- Durham Bike+Walk Implementation Plan (2017)
- Chapel Hill Mobility and Connectivity Plan (2017)
- Duke Bicycle & Pedestrian System Plan (2017)
- Durham Belt Line Plan (ongoing)
- Bicycle Lane Striping (Congestion Mitigation and Air Quality Improvement [CMAQ] grant)
- City of Durham Priority Trails Brochure (2015)
- Durham Vision Zero Action Plan (ongoing)

Table 3-4 summarizes new proposed facilities in the project corridor.

3.1.4.2 Environmental Consequences

The following sections describe the effects of the Proposed Refinements on pedestrian and bicycle connections and infrastructure. In light of the analysis in this Supplemental EA, considering the context and intensity of impacts, and considering all impacts already evaluated and disclosed for pedestrian and bicycle facilities in the previous NEPA documents, FTA does not anticipate there will be any new significant impacts associated with the Proposed Refinements.

Pedestrian and Bicycle Connections

Pedestrian and bicycle improvements included in the Proposed Refinements would improve or enhance pedestrian and bicycle connections in the D-O LRT Corridor and would not preclude other planned improvements or facilities in the project corridor.

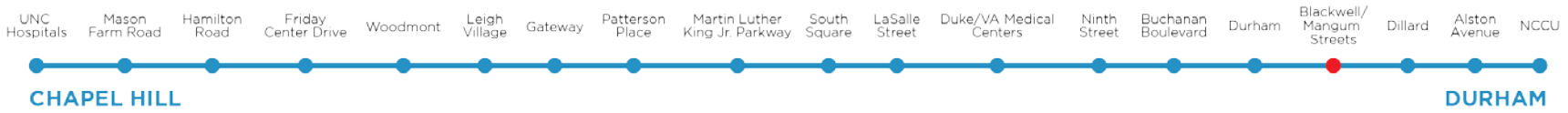
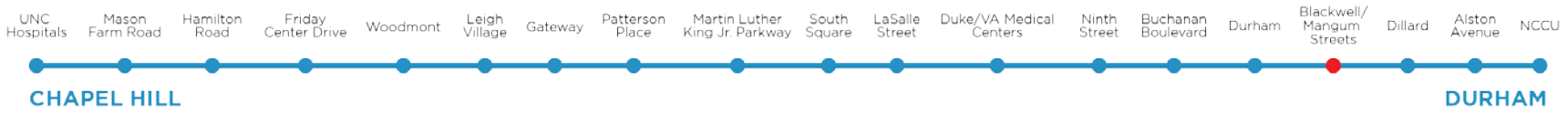


Table 3-4: Proposed Pedestrian and Bicycle Infrastructure by Evaluation Area

Facility Name	Type
UNC Campus Area	
Mason Farm Road (Dean E. Smith Center to Baity Hill Drive)	Sidewalk
East Chapel Hill	
Fordham Boulevard (Highland Wood - Old Mason Farm Road to Prestwick Road)	Multi-use Path
Burning Tree Drive (West Side, to 800 feet North of NC 54)	Sidewalk
NC 54 (North Side, West of Burning Tree Drive)	Multi-use Path
Friday Center Drive (East Side, from Marriott Way south 450 feet to bus shelter)	Sidewalk
Stancell Drive (Barbee Chapel Road to Downing Creek Parkway)	Multi-use Path
Downing Creek Parkway (Cranebridge Place to Stancell Drive)	Sidewalk
Leigh Village	
George King Road (Lift Station to Cleora Drive)	Multi-use Path
US 15-501 Corridor	
Pope Road (East Side, Olde Coach Road to Old Chapel Hill Road)	Sidewalk
Larchmont Road (West Side, University Drive to Gatehouse Lane)	Sidewalk
University Drive (Martin Luther King Jr. Parkway to Shannon Road)	Multi-use Path and Sidewalk
East Side of LRT Tracks (University Drive to South Square Station)	Multi-Use Path
Duke West Campus and Medical Center	
Erwin Road (Emergency Drive to Anderson Street)	Bike Lane/Multi-use Path
Old West Durham/Duke East Campus	
Ninth Street Station (Erwin Road and Pettigrew Street)	Crossing Improvement
Pettigrew Street (Erwin Road to Swift Avenue)	Sidewalk
Downtown Durham	
Chapel Hill Street (Pettigrew Street and Chapel Hill Street)	Crossing Improvement
Blackwell Street (Pettigrew Street to Vivian Street)	Multi-use Path
Pettigrew Street (Blackwell Street to Chatham Place)	Sidewalk
Dillard Street (North Side, East of S. Roxboro Street)	Sidewalk
East Durham	
R. Kelly Bryant Bridge Connector (R. Kelly Bryant Bridge to Alston Avenue)	Multi-use Path
Alston Avenue (East Side, NC 147 ramps to Lawson Street)	Sidewalk Enhancement
Linwood Avenue (North Side, South Alston Avenue to Ridgeway Avenue)	Sidewalk
Lawson Street (South Side, South Alston Avenue to Wabash Street)	Sidewalk
Alston Avenue (West Side, NC 147 Ramps to Lawson Street)	Multi-Use Path



To improve safety, the Proposed Refinements include closure of Blackwell Street to vehicle, pedestrian, and bicycle access between Pettigrew Street and Ramseur Street. GoTriangle proposes to provide a signature civic space crossing over Pettigrew Street, the light rail tracks, the NCRR tracks, and Ramseur Street approximately mid-block between Blackwell and Mangum streets to maintain pedestrian/bicycle connectivity across the rail corridor at this location.

Light Rail Crossings of Pedestrian and Bicycle Infrastructure

Where feasible, the at-grade pedestrian and bicycle crossings of the D-O LRT tracks would be improved through new and enhanced pedestrian sidewalk infrastructure, crosswalks, pedestrian signals, and pedestrian railroad crossing gates. Pedestrian crossings of the light rail tracks would be designed in accordance with current Americans with Disabilities Act design requirements and standards to provide access and mobility for all users. Station areas would be designed according to best management practices for pedestrian and bicycle safety.

3.1.4.3 Mitigation Measures

The improvements to pedestrian and bicycle facilities included in the Proposed Refinements address mitigation commitments of the Amended ROD. The Proposed Refinements that address mitigation commitments of the Amended ROD require no additional mitigation measures for pedestrian and bicycle facilities. The signature civic space over Pettigrew Street, the light rail tracks, the NCRR tracks, and Ramseur Street would maintain pedestrian and bicycle connectivity altered by the closure of Blackwell Street.

3.2 Land Use and Zoning

This section describes existing land uses, future land uses identified in the adopted land use plans of the partner agencies, as well as the potential land use impacts from the Proposed Refinements and how impacts differ from those evaluated in the NEPA documentation of the Previous Design.

In the NEPA documentation for the Previous Design, GoTriangle divided the D-O Corridor into eight evaluation areas based on general land use characteristics and major activity centers. These eight evaluation areas are the University of North Carolina at Chapel Hill (UNC) Campus, East Chapel Hill, Leigh Village, US 15-501 Corridor, Duke West Campus and Medical Center, Old West Durham/Duke East Campus, Downtown Durham, and East Durham. These same evaluation areas are used in this Supplemental EA. See the NEPA documentation for the Previous Design for detailed descriptions of the evaluation areas.

3.2.1 Affected Environment

3.2.1.1 Existing Land Uses

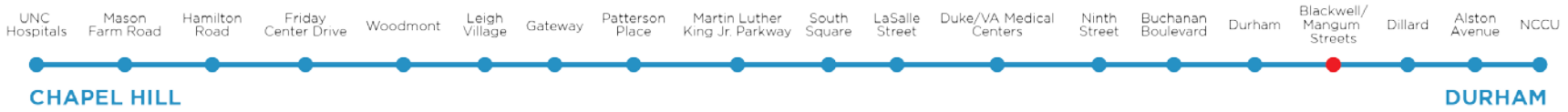
An overview of the project and areas evaluated is provided on **Figure 3-4**. The existing land uses within the evaluation areas that would be affected by the Proposed Refinements remain the same as described in the NEPA documentation for the Previous Design and are shown on **Figure 3-5**. Projected future land use is based on adopted planning documents and is illustrated on **Figure 3-6**.

3.2.1.2 Land Use Plans and Policies

The following sections describe updates to the adopted land use plans and policies that apply to the land uses within the evaluation areas for the Proposed Refinements.

Orange County, Chapel Hill, and UNC

The Orange County and Chapel Hill master plans remain unchanged since the NEPA documentation for the Previous Design. UNC is updating its Campus Master Plan and anticipates approving a final plan by the end of 2018. The Town of Chapel Hill launched an update to its Future Land Use Map and expects to complete the process in 2018.



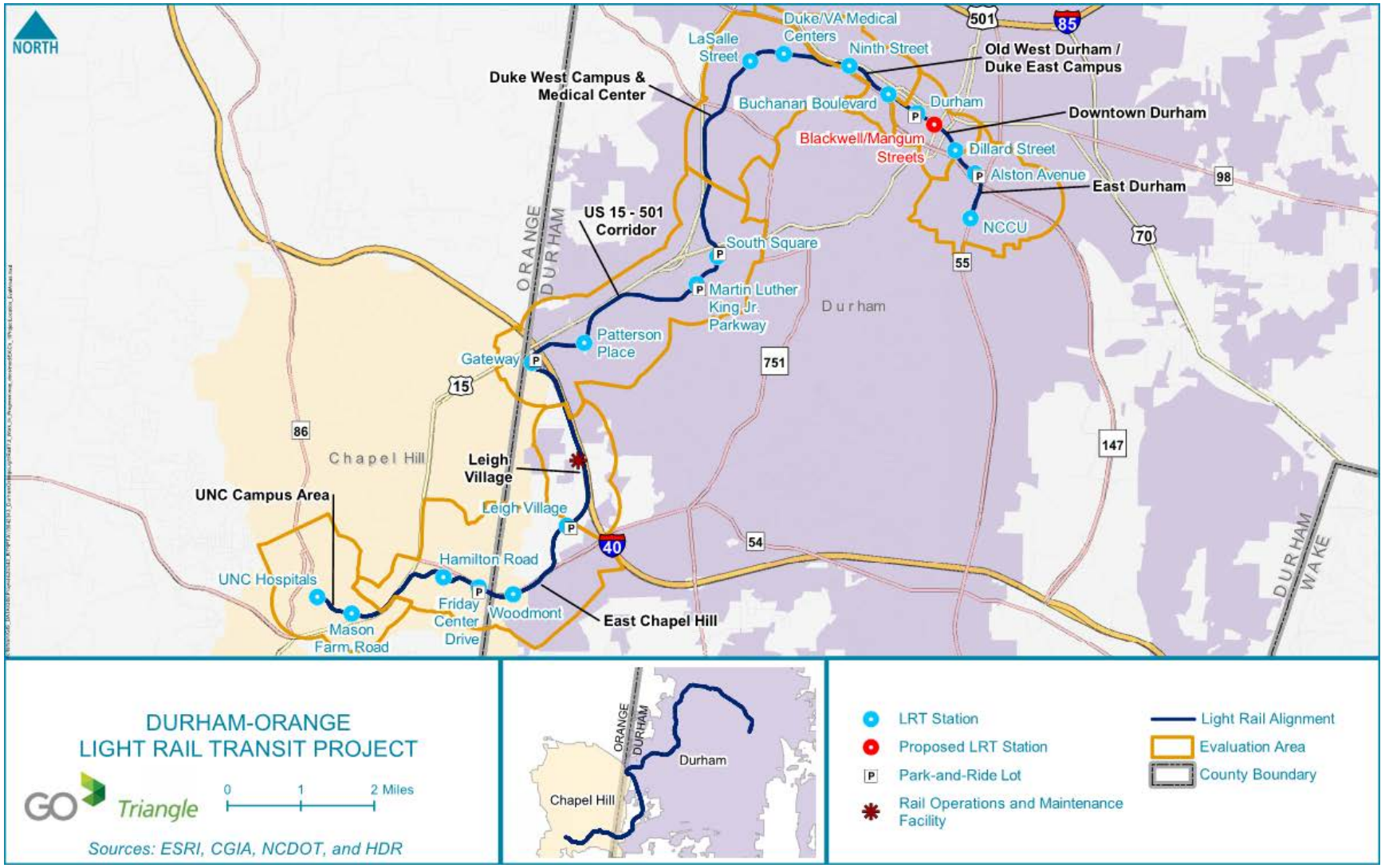
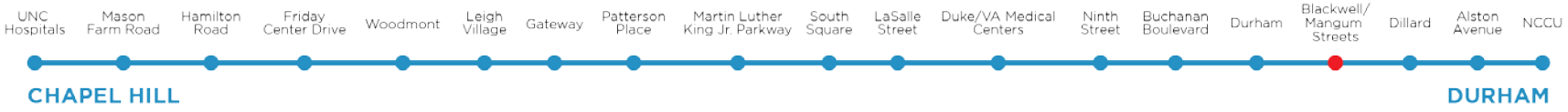


Figure 3-4: Project Overview with Evaluation Areas



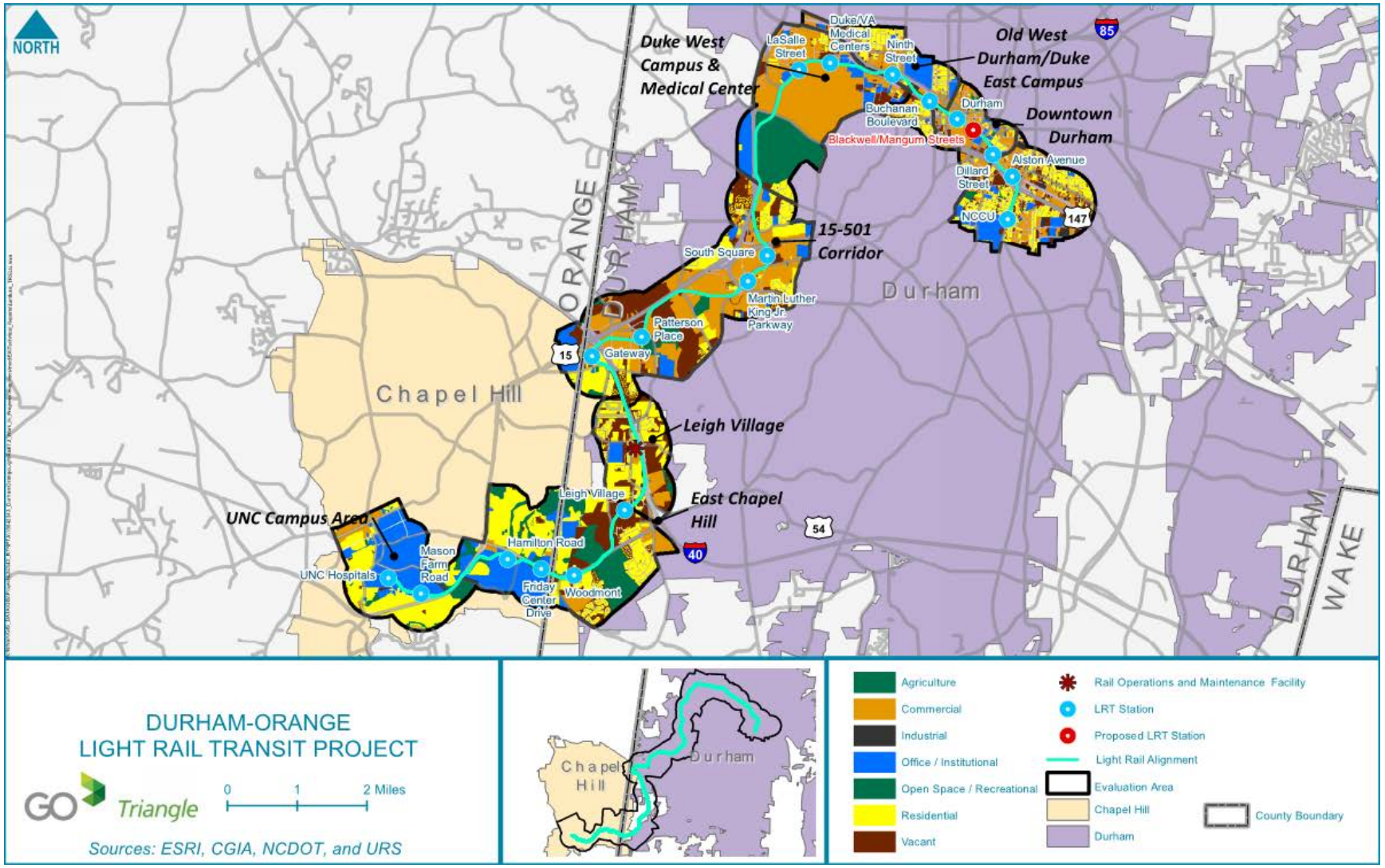
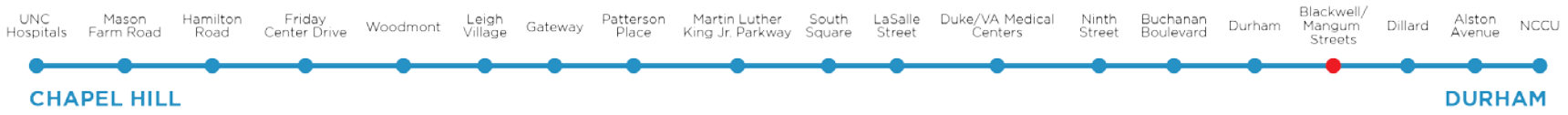


Figure 3-5: Existing Land Use



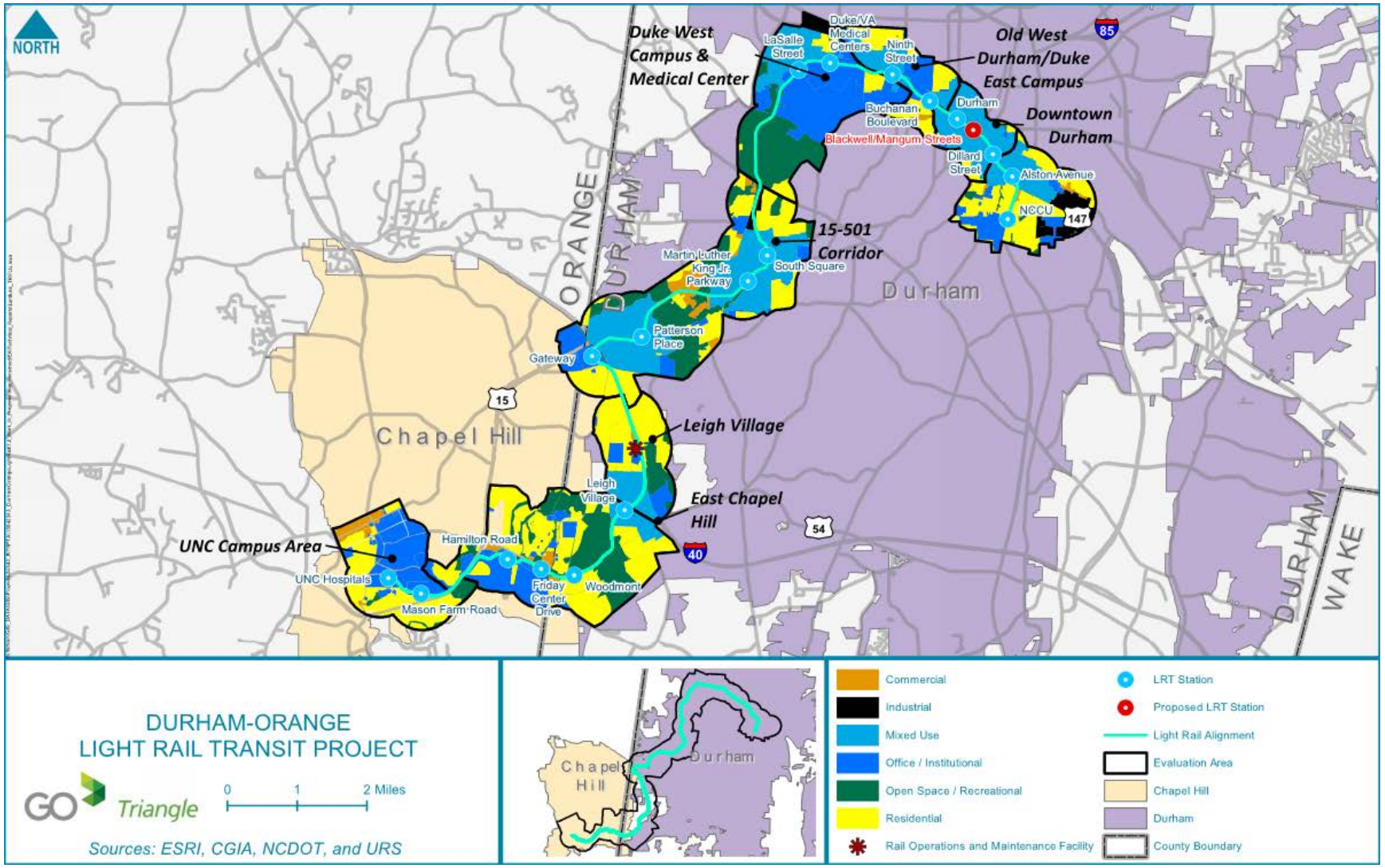
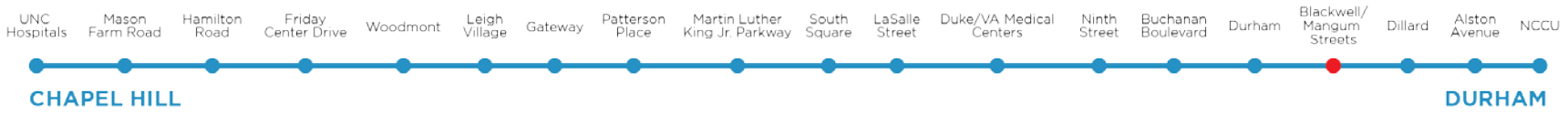


Figure 3-6: Future Land Use



Durham City and County

The Durham City Council and Durham County Board of Commissioners approved amendments to the Durham Comprehensive Plan in November 2017. The plan can be found on the City of Durham webpage at https://durhamnc.gov/346/Comprehensive-Plan. The amendments emphasize transit-oriented design (TOD) associated with the areas served by the D-O LRT Project. For more information on GoTriangle's grant-funded TOD study, please see **appendix C-6** or https://gotriangle.org/tod.

The comprehensive plan assigns future land uses in the vicinity of D-O LRT Project stations to the Compact Neighborhood Tier. The plan amendments update the related Future Land Use Map by revising Compact Neighborhood Tier boundaries, converting suburban transit areas along the D-O Corridor to Compact Neighborhoods and revising their boundaries, amending the underlying future land use designations in the Compact Neighborhoods to Design District, and removing the suburban transit areas not along the D-O Corridor. The development tier and Design District designation are designed to promote TOD and encourage high-density, mixed-use, walkable development within the half-mile area surrounding the transit stations.

The amended Durham Comprehensive Plan updated the Compact Neighborhood Tier to better align with the D-O LRT Project in five general areas: Leigh Village (including Leigh Village Station), Patterson Place (including Patterson Place Station), South Square/Martin Luther King, Jr. (including Martin Luther King, Jr. and South Square stations), Erwin Road (including LaSalle Street and Duke/VA Medical Center stations), and Alston Avenue (including Dillard Street and Alston Avenue stations). The Durham City-County Planning Department has proposed zoning standards to encourage and enable transit supportive development to occur within these station areas.

Additional policies related to Compact Neighborhoods were adopted as part of the amended Durham Comprehensive Plan. These are intended to help guide the Planning Commission and elected officials in making land use policy and zoning decisions in response to public feedback. One policy addresses a City and County resolution on affordable housing in transit areas, giving GoTriangle and private sector partners' incentives to support affordable housing within one half mile of each D-O LRT station.

The Durham City Council and Durham County Board of Commissioners approved amendments to the joint Unified Development Ordinance (UDO) regarding the Design District zoning provisions intended to be applied to all D-O LRT station areas. These UDO amendments are designed to enhance the walkability and transit-accessibility of future developments near station areas, and mandate certain roadway cross-sections for all new roads built in the Design Districts.

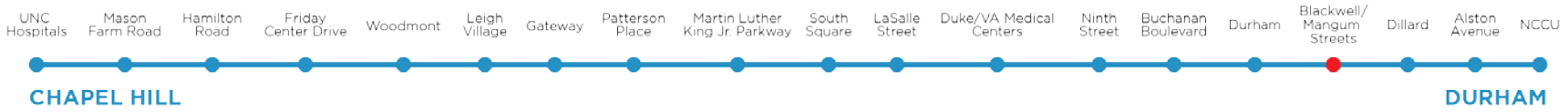
The Downtown Durham Master Plan was updated in 2017 to lay out the vision and broader economic development goals of the downtown area, including the need for increased transportation alternatives and TOD. Public input through public meetings, stakeholder interviews, and focus groups influenced the development of several master plan themes including logistics, diversity, and design.

Duke University has not updated its campus master plan since the NEPA documentation for the Previous Design.

NCCU is in the process of updating its 2007 campus master plan.

Corridor Development Projects

GoTriangle, in collaboration with the Town of Chapel Hill, City of Durham, Durham County, and Triangle J Council of Governments, was awarded a $1.7 million grant from FTA's Pilot Program



for TOD Planning to accelerate planning efforts around the D-O LRT stations. The TOD planning study identifies infrastructure plans, including plans to meet bicycle, pedestrian, and water and sewer needs at multiple stations. The study further recommended refinements to platform locations to improve conditions for future development. Other efforts funded by the FTA grant include educating the community about the benefits of TOD, conducting an economic analysis of the corridor and each station area, producing conceptual development and infrastructure plans for each station area, developing affordable housing strategies, and creating a joint development policy.

The goal of TOD efforts at the D-O LRT stations is to promote a variety of uses and greater density of uses near the stations to increase use and maximize the positive benefits of the D-O LRT Project.

In March 2018, GoTriangle submitted several applications to the City of Durham relating to the ROMF site. These applications included a petition for a zoning map change, an application for a Comprehensive Plan amendment, and a petition to annex the ROMF site into the City limits. Public outreach related to these applications and design of the ROMF and overall site are discussed in section 6.3.1**.**

3.2.2 Environmental Consequences

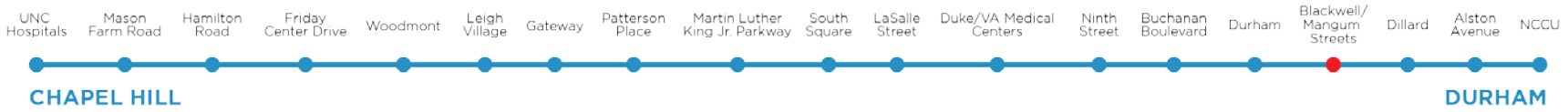
The Proposed Refinements are consistent with the municipal and county goals to encourage development in a compact, sustainable, and transit-oriented manner. Throughout the project corridor, the Proposed Refinements incorporate modifications to streets, parking, pedestrian routes, and multi-use paths to encourage TOD adjacent to station areas and improve multi-modal connectivity with surrounding neighborhoods. The Proposed Refinements include station reconfigurations and alignment shifts to support economic development potential in the vicinity of the stations. The Proposed Refinements include design changes that are consistent with regional trends towards compact development.

The following sections describe the effects of the Proposed Refinements on land use and zoning by evaluation area. In light of the analysis in this Supplemental EA, considering the context and intensity of impacts, and considering all impacts already evaluated and disclosed for land use and zoning in the previous NEPA documents, FTA does not anticipate there will be any new significant impacts associated with the Proposed Refinements.

3.2.2.1 US 15-501 Corridor

Gateway Station

The Proposed Refinements at Gateway Station were recommended in the adopted updates to Durham and Orange counties' transit plans. Local government stakeholders identified that the location of the Gateway Station in the Previous Design would not maximize the potential economic development opportunities for both Durham and Orange counties. An analysis conducted under the grant-funded TOD planning study recommended shifting the D-O LRT alignment and station location to the west. This change in the alignment would expand the overall economic development opportunity at Gateway Station and place more land in Orange County within ½ mile of the station platform. The station platform and a large portion of the station area within the ½ mile of the station platform remains within Durham County, so the increased opportunity in Orange County does not necessarily reduce the opportunity in Durham County. The Proposed Refinement would change the design at Gateway Station to include acquisition and site preparation for a larger park-and-ride facility that may also support the opportunity for future joint development (redevelopment).



Patterson Place Station

An analysis conducted under the TOD planning study concluded that the location of Patterson Place Station in the Previous Design, behind a grocery store loading dock, would detract from the access to and visibility of the station, limiting future development adjacent to the station area. In addition, the track alignment in the Previous Design created an unusable remnant parcel to the north of Southwest Durham Drive. The Proposed Refinements would shift the Patterson Place Station platform approximately 500 feet to the northeast and revise the associated track alignment across Southwest Durham Drive (see **Figure 2-9**). These changes would improve access to and visibility of the station and the redevelopment potential of the remaining parcels in proximity to the station. These changes are consistent with the Durham Comprehensive Plan and the existing boundaries of the Patterson Place Compact Neighborhood development Tier. The Durham City-County Planning Department continues to conduct ongoing public outreach to determine the future land-use densities that would be permitted within different portions of the Compact Neighborhood Tier.

3.2.2.2 Downtown Durham

Triangular Parcel near Durham Station

The TOD study indicated that the triangular parcel owned by GoTriangle near Durham Station (**Figure 3-7**), as indicated in the Previous Design, is an ideal location for future joint development which would foster economic development opportunities. With TOD, the potential land uses at this site and around the station would be more intensive than described in the NEPA documentation for the Previous Design.

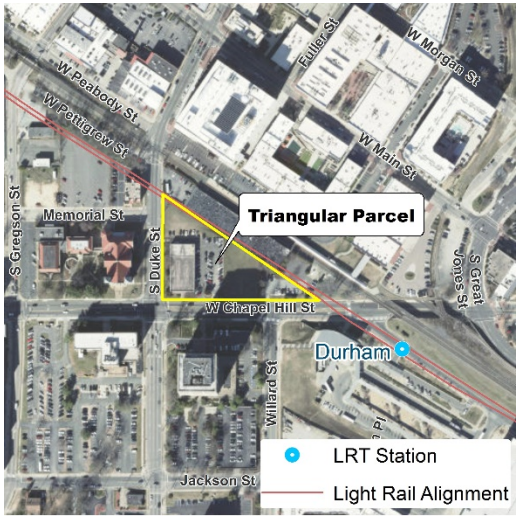


Figure 3-7: Triangular Parcel near Durham Station

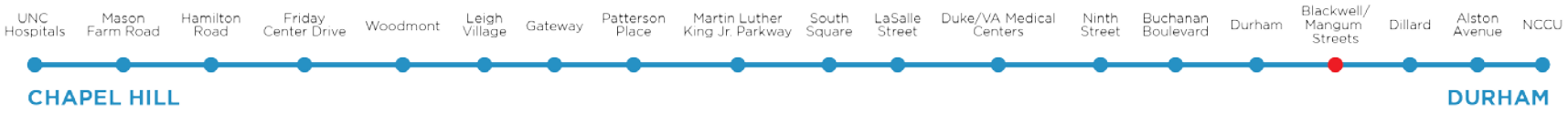
Blackwell/Mangum Streets Station

The Blackwell/Mangum Streets Station is a proposed refinement that would add a new proposed station near the DPAC between Blackwell and Mangum Streets (see **Figure 2-24)**. The proposed Blackwell/Mangum Streets Station would improve connectivity by providing direct transit service to key destinations in downtown Durham, such as DPAC, Durham Bulls Athletic Park, and the American Tobacco Campus. The future land uses that call for mixed development are unlikely to change as a result of the station; however, this station would provide enhanced access to additional redevelopment and infill locations. These land uses align with the public and private investments and development projects that have been completed or are underway in the downtown Durham area.

3.2.2.3 East Durham

Alston Avenue Station

The Proposed Refinements would move the Alston Avenue Station platform closer to the intersection of Pettigrew Street and Grant Street (see **Figure 2-27**). This change would provide direct access between the station and existing and future planned development along Grant Street. The improved access may accelerate development along Grant Street.



3.2.3 Mitigation Measures

The Proposed Refinements would not result in new land use or zoning impacts that would require additional mitigation commitments beyond those included in the Amended ROD.

3.3 Neighborhoods and Community Resources

This section describes the existing neighborhoods and community resources and potential impacts that would be associated with the Proposed Refinements and how impacts differ from those evaluated in the NEPA documentation of the Previous Design. Potential impacts are discussed qualitatively in terms of the type of impacts to access and mobility, community cohesion, and community resources.

DEFINITIONS:

- **Access and Mobility –** Terms used to describe travel into and out of communities and neighborhoods. They are used to explain the presence or absence of transportation connections and how well the transportation connections function.
- **Community Cohesion –** The strong and positive relationship between people from different backgrounds and their workplace, neighborhoods, or schools.
- **Community Resources –** Locally accessible amenities that support the well-being of community members, including emergency services, schools, and shops.

3.3.1 Affected Environment

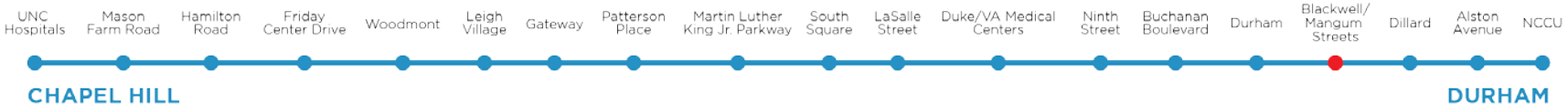
Based on review of study area resources for this Supplemental EA, there is one additional community resource that would be affected by the Proposed Refinements that was not described in the NEPA documentation for the Previous Design. This additional community resource is the Indigo Montessori School located at 205 S. Gregson Street in Durham, which is a school resource in the Old West Durham/Duke East Campus Evaluation Area (**Figure 3-8**). This building was vacant during the NEPA documentation of the previous design; since the publication of the Amended ROD, the school has moved into the building. All of the other neighborhoods and community resources identified in the previous NEPA documentation remain the same and were evaluated in this Supplemental EA.

Figure 3-8: Indigo Montessori School Parcel

3.3.2 Environmental Consequences

This section summarizes the potential impacts of the Proposed Refinements on neighborhoods and community resources.

The Proposed Refinements include design elements that would improve vehicular and pedestrian movement at



stations and improve connectivity between the station areas and the surrounding residential neighborhoods and community resources, as compared to the Previous Design. As noted in chapter 2, many of these improvements would meet the mitigation commitments stipulated in the Amended ROD. Some of the Proposed Refinements, such as alignment shifts, modifications to parking facilities, and elevating the light rail are refinements that would have no effect on neighborhoods or community resources. **Table 3-5** presents a summary of the areas where Proposed Refinements would change the impacts to neighborhoods and community resources relative to the Previous Design. While additional property displacements, noise, and visual impacts would result from the Proposed Refinements, the overall benefits of the D-O LRT Project to neighborhoods and community resources remain unchanged. In light of the analysis in this Supplemental EA, considering the context and intensity of impacts, and considering all impacts already evaluated and disclosed for neighborhoods and community resources in the previous NEPA documents, FTA does not anticipate there will be any new significant impacts associated with the Proposed Refinements.

For a detailed discussion of the analysis for each evaluation area, see **appendix D**. Potential impacts to neighborhoods and community resources from noise, vibration, and visual impacts are discussed in other sections of this Supplemental EA.

Table 3-5: Proposed Refinements Summary

Evaluation Area	Previous Design	Proposed Refinement
UNC Campus Area	No Impact	No Impact
East Chapel Hill	AM, CR	AM, CR
Leigh Village	No Impact	No Impact
US 15-501	AM	CC
Duke West Campus	CR	CR
Old West Durham/ Duke East Campus	CR	CR
Downtown Durham	No Impact	AM
East Durham/NCCU	AM, CR	AM, CR

Notes:
AM = impacts to access and mobility
CC = impacts to community cohesion
CR = impacts to community resources

3.3.2.1 UNC Campus Evaluation Area

Access and Mobility

The Proposed Refinements at UNC Hospitals Station include modifications to roadway configurations and elimination of the pedestrian bridge of the Previous Design. These changes would improve vehicular access and traffic movement in the parking decks and improve both vehicular and pedestrian access between the station, the parking decks, and the hospitals relative to the Previous Design; i.e., pedestrians would not need to circulate via a pedestrian bridge and through the parking deck to access the hospital and surrounding university buildings from the station. Under the Proposed Refinements, pedestrian access would be provided along East Drive.

The Proposed Refinements at the Mason Farm Road Station include widened walkways, added sidewalks, and stairs and elevators for access to the Dean E. Smith Center. Pedestrian access and mobility would improve relative to the Previous Design.

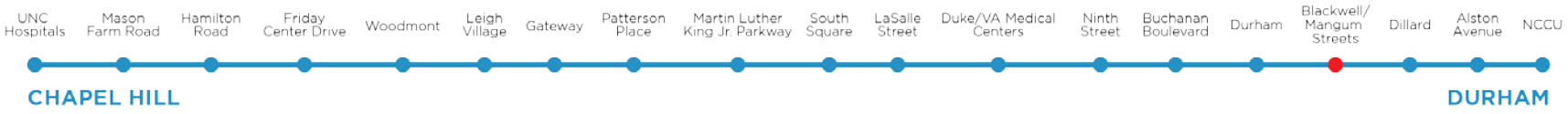
Community Cohesion and Community Resources

The Proposed Refinements would not affect community cohesion or community resources in this area, beyond what is described in the NEPA documentation for the Previous Design.

3.3.2.2 East Chapel Hill Evaluation Area

Access and Mobility

The Proposed Refinements in the East Chapel Hill Evaluation Area would improve connectivity for the Hamilton Road, Friday Center Drive, and Woodmont stations with the surrounding residential neighborhoods relative to the impacts described in the NEPA documentation for the Previous Design.



Added sidewalks at the four stations and multi-use paths in the vicinity of the Hamilton and Woodmont stations. In addition, a multi-use path along the light rail alignment was added from Old Mason Farm Road on the east side of Fordham Boulevard to Prestwick Road. These facilities would enhance access for pedestrians and improve mobility for residents in the neighborhoods that surround the stations.

Reconfiguration of the roadway network at Leigh Village Station would improve vehicular access and mobility to the station, including improved access to the park-and-ride lot, relative to the impacts described in the NEPA documentation for the Previous Design.

Community Cohesion and Community Resources

As a result of the proposed changes to the roadway network at Leigh Village Station, a total of two additional residential properties would be displaced on Cleora Drive and Wendell Road. The loss of residences in the community could affect community cohesion. No other effects to community cohesion would occur in this area as a result of the Proposed Refinements.

3.3.2.3 Leigh Village Evaluation Area

Access and Mobility

The Proposed Refinements in this evaluation area would not affect pedestrian or vehicular access and mobility relative to the Previous Design.

Community Cohesion and Community Resources

The Proposed Refinements would not affect community cohesion or community resources in this evaluation area, beyond what is described in the NEPA documentation for the Previous Design.

3.3.2.4 US 15-501 Evaluation Area

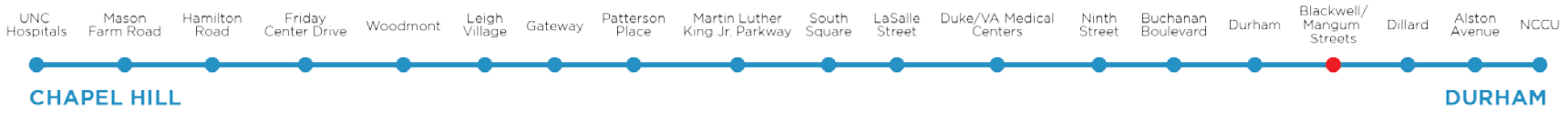
Access and Mobility

The Proposed Refinements at Gateway Station (see **Figure 2-8**) would improve connectivity for pedestrians and motorists between the station and neighborhoods to the south with added sidewalks and reconfigured roadways. This would be an improvement to neighborhood access to the station relative to the Previous Design.

The Proposed Refinement at Patterson Place Station would shift the station platform and associated track 500 feet northeastward, away from a grocery store loading dock (see **Figure 2-9**). The shifted station location improves the visibility of the station relative to the surrounding neighborhoods, and improves access from the neighborhoods to the station. The change in station location also benefits the neighborhood by preserving space for future compact development.

In the area of University Drive, near the Martin Luther King Jr. Parkway Station, the Proposed Refinements would add a sidewalk along the west side of Larchmont Road between University Drive and Gatehouse Lane, which would enhance connectivity between the station area and surrounding neighborhoods relative to the Previous Design. The proposed traffic signal at Larchmont Road would improve vehicular mobility to University Drive.

The Proposed Refinements would also shift the light rail alignment and alter the configuration and the location of the Martin Luther King Jr. Parkway Station (see **Figure 2-10**), which would provide better pedestrian and bicycle access across University Drive and direct pedestrian access to the associated station park-and-ride lot. The station refinement better integrates the station with the existing development relative to the Previous Design. Additional design refinements to sidewalks, bicycle lanes, and multi-use paths improve bicycle and pedestrian access routes to the station.



The Proposed Refinements at South Square Station would add parking and modify existing sidewalks and crosswalks to improve station accessibility for vehicles and pedestrians. The location of the platform would be shifted (see **Figure 2-13**) and changed to ground level as a result of the refinements, which would allow pedestrian access to the platform from both sides of the adjacent roadways. The underpass at University Drive and Shannon Road would improve vehicular mobility. These changes would improve pedestrian circulation and connectivity and vehicular mobility between the surrounding neighborhoods and the station relative to the Previous Design.

The Proposed Refinements to the alignment in the vicinity of Conifer Glen Lane (revising the elevated structure from the Previous Design to an at-grade alignment) would close Tower Boulevard access to/from Parc at University Tower Apartments via Conifer Glen Lane (see **appendix A-2, Sheet 20)**. A new access road to the residential complex from Pickett Road is included in the Proposed Refinements. This change in access between Parc at University Tower Apartments and Tower Boulevard would result in a change in travel patterns that was not described in the NEPA documentation for the Previous Design.

Access to a commercial property on Western Bypass would change with the rail alignment shifted to the east of Western Bypass. The Proposed Refinements would maintain two access points to the property, including a driveway with direct access to/from Western Bypass that has an at-grade crossing of the light rail track.

Community Cohesion and Community Resources

The Proposed Refinements at Gateway Station and the corresponding track alignment would cause displacement of two additional residential properties on White Oak Drive, and one additional property at the intersection of White Oak Drive and Chapel Hill Lane.

The proposed shift in the location of Patterson Place Station would result in one additional residential displacement on Southwest Durham Drive and two additional residential displacements on Sayward Drive.

The Proposed Refinements near Martin Luther King Jr., Parkway Station would displace one multi-family residential building containing four condominiums and two banks at Parkway Plaza.

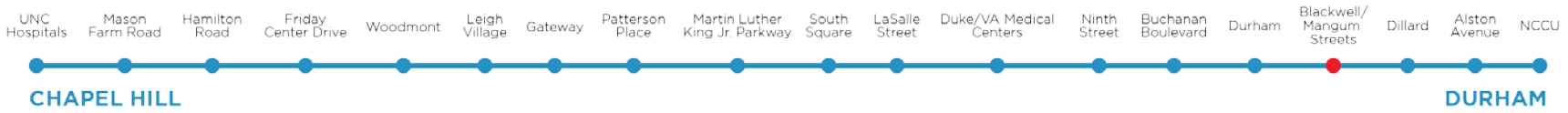
The Proposed Refinements at South Square Station would result in one additional commercial displacement.

3.3.2.5 Duke West Campus and Medical Center Evaluation Area

Access and Mobility

The Proposed Refinements associated with the light rail alignment along Erwin Road would change the configuration of intersections between roadways and the alignment. Relative to the Previous Design, vehicular traffic flow would be improved, including emergency vehicle access to hospitals, due to the grade separation of the alignment east of LaSalle Street.

The relocated Duke/VA Medical Centers Station would be an elevated station just west of Fulton Street between the Durham VA Medical Center and the Duke Eye Care Center. Pedestrian bridges would connect the station with the hospital areas, improving pedestrian access and mobility between the station and the hospitals relative to the Previous Design. Access to the station from neighborhoods in proximity to Fulton Street would be the same relative to the effects described in the NEPA documentation for the Previous Design. The shift in location of the station (see **Figure 2-20**) would increase the travel distance for neighborhoods to the east of Trent Drive, in particular Duke University's Central Campus, and lower the accessibility of those neighborhoods to the Duke/VA Medical Centers Station



relative to the Previous Design. However, neighborhoods to the east would continue to have proximate access to the Ninth Street Station.

Community Cohesion and Community Resources

The Proposed Refinements would not affect community cohesion in this area beyond what is described in the NEPA documentation for the Previous Design. The pedestrian access improvements associated with the Duke/VA Medical Centers Station would result in enhanced pedestrian connectivity between the station and two community resources: the Durham VA Medical Center and Duke University Medical Center. Changes in traffic and pedestrian flow along Erwin Drive would improve emergency vehicle access to the hospitals.

3.3.2.6 Old West Durham/ Durham East Campus

Access and Mobility

The Proposed Refinements at Ninth Street Station include shifting the station platform location to span the adjacent roadway, thereby facilitating pedestrian access to the platforms from both sides of the adjacent roadway, and adding sidewalk on the south side of Pettigrew Street from Erwin Road to Swift Avenue. The refinements would improve pedestrian access and mobility around Ninth Street Station relative to the Previous Design which only provided access to the station from the west side of Erwin Road.

Refinements at the Buchanan Boulevard Station include reconfiguration of roadway and parking facilities to improve vehicular and pedestrian access to the station.

Community Cohesion and Community Resources

The Proposed Refinements would not affect community cohesion in the area, as the proposed alignment is located along an existing transportation corridor. Previously identified community resources in this area would not be affected by the Proposed Refinements. One commercial property identified for acquisition in the previous NEPA documentation was recently converted to institutional use (Indigo Montessori School, see **Figure 3-8**). This property acquisition would still be required under the Proposed Refinements; as such, one new community resource would be impacted in this area.

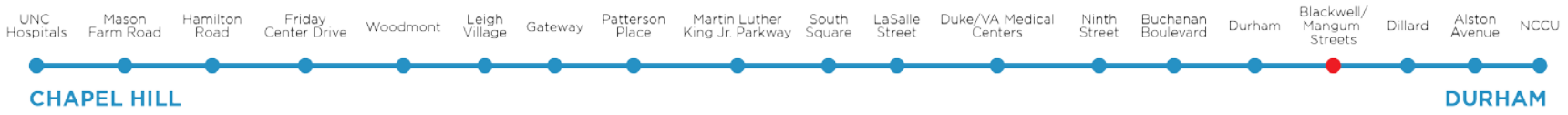
3.3.2.7 Downtown Durham Evaluation Area

Access and Mobility

The Proposed Refinements propose to add a new light rail station between Blackwell and Mangum Streets. The proposed Blackwell/Mangum Streets Station (see **Figure 2-24**) would improve access and mobility in the surrounding neighborhood relative to the Previous Design by increasing connectivity to transit.

The Proposed Refinements would also add a multi-use path on the east side of Blackwell Street from Pettigrew Street to Vivian Street, and a sidewalk on Pettigrew Street from Blackwell Street to Chatham Place. The proposed additional pedestrian features would enhance access from the station to key destinations in Downtown Durham.

As noted in Section 3.1.2, rather than raising Pettigrew Street at the intersection of Blackwell Street, which would have required the addition of several large retaining walls resulting in adverse effects on historic resources in the vicinity (including a National Historic Landmark), GoTriangle proposes closing Blackwell Street to vehicle, pedestrian, and bicycle access between Ramseur Street and Pettigrew Street and raising Pettigrew Street east of the Blackwell/Mangum Street Station. The intersections of Blackwell Street/Pettigrew Street and Ramseur Street/Corcoran Street would become T-intersections on each side of the NCRR tracks. Dillard Street would be converted to one-way southbound only at the NCRR crossing. These changes would change travel patterns in this area of



Downtown Durham. The closure of Blackwell Street between Ramseur and Pettigrew Streets would improve safety for travelers in this area. The addition of a signature civic space over Pettigrew Street, the light rail tracks, the NCRR tracks, and Ramseur Street approximately mid-block between Blackwell and Mangum streets would maintain connectivity for pedestrians and bicyclists affected by the closure of Blackwell Street.

The Proposed Refinements to Pettigrew Street, Ramseur Street, Blackwell Street, and Dillard Street Station would alter traffic flow in these areas through alignment changes and roadway reconfiguration (see **Figure 2-24)**. Reconfiguration of a portion of Ramseur Street to two-way operation may change bus operations between Blackwell Street and Dillard Street and would improve efficiency of operations for bus and light rail. The separation of bus and light rail operations would improve mobility for vehicles, pedestrians, and bicycles by reducing conflict in travel lanes.

The refinement at Dillard Street Station would ease traffic flow along Pettigrew Street and accommodate access to a new adjacent apartment development. Improved traffic flow resulting from the refinements at Dillard Street Station would improve access and mobility related to the station relative to the Previous Design.

The Proposed Refinements include a new pedestrian sidewalk along the north side of Dillard Street to connect the existing sidewalk on Dillard Street with the existing sidewalk on S. Roxboro Street. This would enhance pedestrian access between the surrounding neighborhood and the Dillard Street Station Area and represents an improvement to pedestrian access relative to the Previous Design.

Community Cohesion and Community Resources

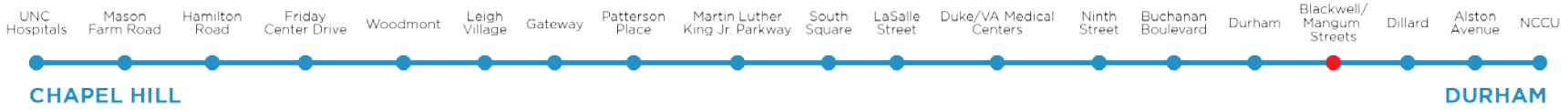
The proposed Blackwell/Mangum Streets Station would improve community access to transit. The added sidewalk on Dillard Street would improve connectivity for the neighborhood and enhance community cohesion. The proposed Blackwell/Mangum Streets Station would serve to connect local community resources in this urban area, including DPAC, Durham Bulls Athletic Park, and the American Tobacco Campus, with larger customer, employee, and job bases. The reconfiguration of Blackwell Street and Dillard Street may alter the route that patrons use to access businesses in the American Tobacco Campus. The shift in alignment of Pettigrew Street would avoid adverse effects to the W.T. Blackwell and Co. (Bull Durham) Tobacco Factory (a National Historic Landmark).

3.3.2.8 East Durham

Access and Mobility

The Proposed Refinements include replacement of the proposed Alston Avenue Station park-and-ride garage with surface parking and moving the Alston Avenue Station platform closer to the intersection of Pettigrew Street and Grant Street to improve pedestrian access to the station (see **Figure 2-27**). To enhance pedestrian routes, an existing path from the R. Kelly Bryant Bridge to Alston Avenue just north of NC 147 would be converted to a multi-use path and would include lighting and wayfinding. These refinements would improve pedestrian access and mobility to the R. Kelly Bryant Bridge Trail relative to the Previous Design. The multi-use path also would provide improved access to existing and future planned development along Grant Street.

The Proposed Refinements would add sidewalks along the north side of Linwood Avenue between Ridgeway Avenue and Alston Avenue and along the south side of Lawson Street between Alston Avenue and Wabash Street. These changes would improve pedestrian access and enhance connectivity between the surrounding neighborhood and the NCCU Station.



The change in roadway configuration at the Alston Avenue intersections with Price Avenue and Massey Avenue would change automobile access from the neighborhood west of Alston Avenue. Price and Massey Avenues would join as a loop road, and vehicles would have to use an alternate route to access Alston Avenue.

Community Cohesion and Community Resources

Closure of the Pettigrew Street driveway at the Smith/Avery Center (John Avery) Boys and Girls Club would reduce driveway access; however, access would remain through the Grant Street driveway.

The Proposed Refinements along Alston Avenue would require one additional business displacement at Alston Avenue Station for the park-and-ride lot. Off of Alston Avenue, one additional residential displacement on Linwood Avenue would result from refinements to the roadway design.

The Proposed Refinements would eliminate direct access to Alston Avenue at Massey and Price Avenues, which was provided in the Previous Design with right-in/right-out turns, and create a loop road connecting the two streets. While direct access to Alston Avenue would be eliminated, vehicular traffic from Massey Avenue and Price Avenue could instead use Linwood Avenue or Dupree Street to access Alston Avenue.

With no direct through-traffic to Alston Avenue from Massey Avenue or Price Avenue, the Massey/Price loop road would separate homes on these streets from direct vehicular access to neighborhoods east of Alston Avenue and affect community cohesion in that neighborhood. Access for school buses and emergency vehicles to enter and exit the neighborhood would be maintained through the surrounding street grid network.

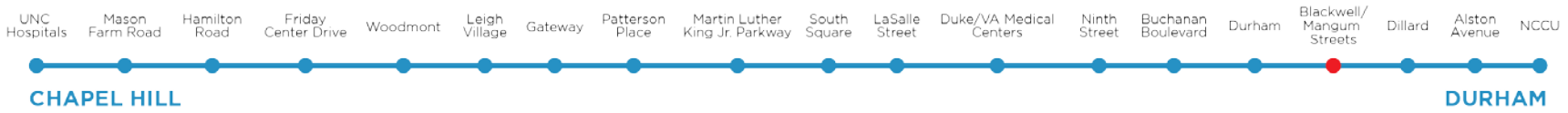
Sidewalk accommodations would be added from Alston Avenue to Massey Avenue and Price Avenue to provide direct pedestrian and bicycle access to the homes on these streets.

The Proposed Refinements would require a residential displacement on Dupree Street. This property is required by NCCU for construction of a new academic building identified in the NCCU Master Plan, and GoTriangle will coordinate the property transfer with NCCU.

3.3.3 Mitigation

New or modified impacts to neighborhoods and community resources resulting from the Proposed Refinements relative to the impacts presented in the NEPA documentation of the Previous Design would occur at Conifer Glen Lane (access and mobility impacts on residents of Parc at University Tower Apartments), Dillard Street Station (parking impacts), Durham Street Station (visual impacts), Blackwell/Mangum Streets Station (access and mobility impacts on vehicles, pedestrians, and bicycles as a result of closing Blackwell Street between Ramseur and Pettigrew streets; visual impacts) and along Alston Avenue (access and mobility impacts, relocations). Impacts at these locations would be consistent with the impacts already identified in the NEPA documentation of the Previous Design.

Mitigation Commitment #NCR01 in the Amended ROD addresses changes to neighborhood traffic operations and street patterns and would apply to neighborhood impacts associated with the Proposed Refinements. The proposed signature civic space across Pettigrew Street, the light rail tracks, the NCRR tracks, and Ramseur Street would maintain pedestrian and bicycle connectivity altered by the closure of Blackwell Street.



Proposed Refinements would require additional displacements near the Leigh Village, Gateway, Patterson Place, and Martin Luther King Jr. Parkway stations, and along Alston Avenue. Impacts at these locations would be consistent with the types of impacts identified in the NEPA documentation for the Previous Design and addressed by mitigation commitments included in the Amended ROD. No additional mitigation measures for displacements beyond those included in the Amended ROD would be required.

3.4 Visual and Aesthetic Conditions

This section summarizes the Visual and Aesthetics impacts detailed in **appendix E**, Visual and Aesthetics Technical Report, which includes a re-assessment of visual impacts in Landscape Units #1 through #11 based on the Proposed Refinements and how impacts differ from those evaluated in the NEPA documentation of the Previous Design. The methodology for assessing visual impacts used in the NEPA documentation for the Previous Design was also used to assess the visual impacts of the Proposed Refinements.

DEFINITION:

- **Landscape Units –** Geographic areas within the viewshed where views would have a similar context or character. For detailed description of the landscape units, see DEIS appendix K15.

3.4.1 Affected Environment

The Proposed Refinements would occur within the 11 landscape units evaluated in the NEPA documentation for the Previous Design (see **Figure 3-9**). The viewers and viewer preferences in each of the landscape units remain the same as presented in the NEPA documentation for the Previous Design.

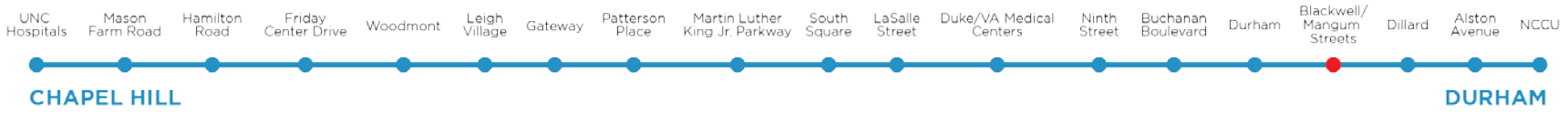
Visual resources are the same as described in the NEPA documentation for the Previous Design, with exceptions noted in **appendix E**. The existing visual quality in each of the landscape units has not changed.

3.4.2 Environmental Consequences

The following sections present the potential visual effects of the Proposed Refinements as compared to the potential effects of the Previous Design. In light of the analysis in this Supplemental EA, considering the context and intensity of impacts, and considering all impacts already evaluated and disclosed for visual resources in the previous NEPA documents, FTA does not anticipate there will be any new significant impacts associated with the Proposed Refinements.

The degree of visual changes are characterized by the following:

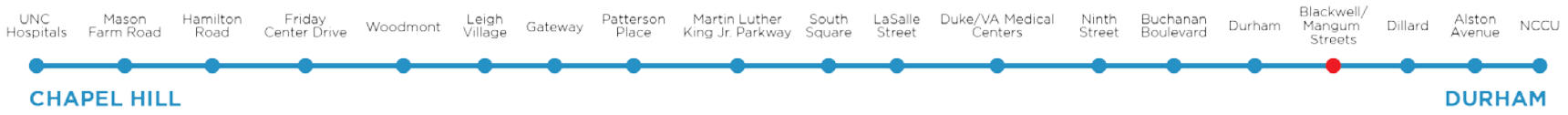
- **Substantial change –** A significant impact would be made to the visual quality and existing character of the study area.
- **Moderate change –** Notable changes would take place and affect the visual quality and existing character of the study area.
- **Minor change –** Few or very specific instances can be noted that would have an effect on the visual quality and character of the study area.



3.4.2.1 Landscape Unit #1 - University (UNC Campus Area)

Visual impacts of the Previous Design in Landscape Unit #1 are moderate. In this landscape unit, the Proposed Refinements that would result in visual changes are the modifications to pedestrian facilities and track alignment adjustments.

The Proposed Refinements would have the same magnitude of visual change to all visual elements in this landscape unit as the Previous Design, with the exception of changes to the streetscape. With the removal of the pedestrian bridge at UNC Hospitals Station and addition of pedestrian access along East Drive, the streetscape impacts would be reduced to minor at this location. No other proposed modifications would result in different degrees of visual change in Landscape Unit #1 relative to the Previous Design. The overall visual impact of the D-O LRT Project with the Proposed Refinements would remain moderate.



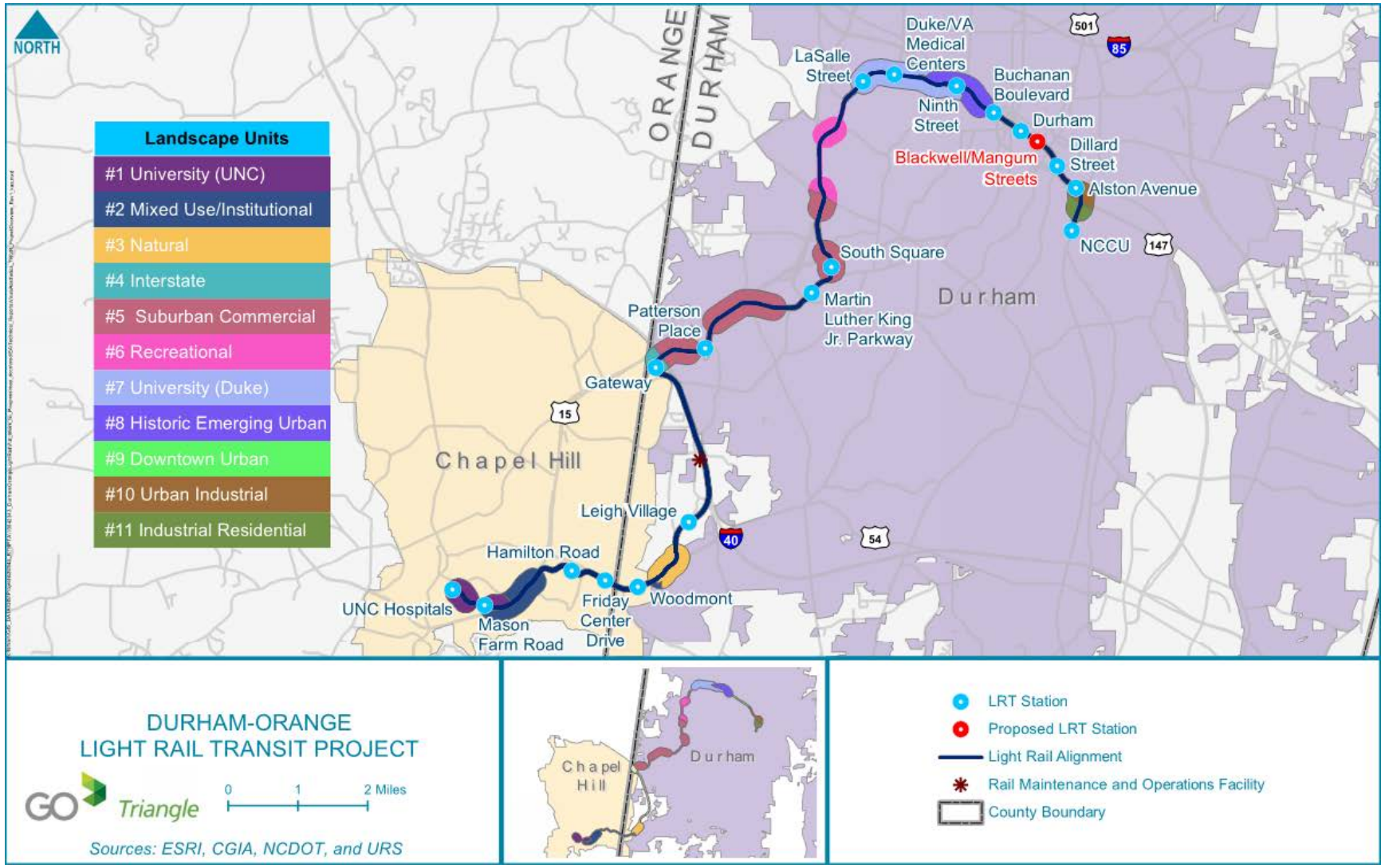
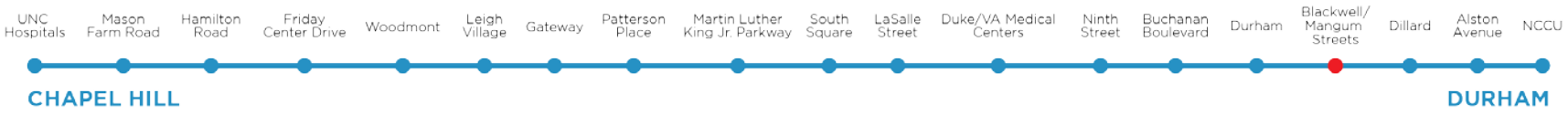


Figure 3-9: Visual Resource Landscape Units



3.4.2.2 Landscape Unit #2 - Mixed Use/Institutional (East Chapel Hill)

Visual impacts of the Previous Design in Landscape Unit #2 are low to moderate. The Proposed Refinements in Landscape Unit #2 that would result in visual changes are improvements to pedestrian facilities in the vicinity of the Hamilton Road, Friday Center Drive, and Woodmont stations. The Proposed Refinements would have the same magnitude of visual change to all visual elements in this landscape unit as the Previous Design. The overall visual impact of the D-O LRT Project with the Proposed Refinements would remain low to moderate.

3.4.2.3 Landscape Unit #3 - Natural (East Chapel Hill)

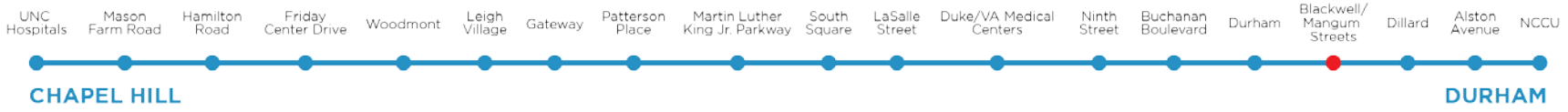
Visual impacts of the Previous Design in Landscape Unit #3 are moderate. The Proposed Refinements in this landscape unit that would create a visual change are limited to reconfigured roadways, light rail infrastructure modifications, displacement of structures, and an additional multi-use path. These Proposed Refinements would require tree clearing and two more residential acquisitions than in the Previous Design; however, the modifications would be within a heavily forested area and would not be visible from viewers on NC 54 or in residential neighborhoods. The additional residential acquisitions would increase the degree of visual change from minor (Previous Design) to moderate (Proposed Refinements). The Proposed Refinements would have the same degree of visual change as the Previous Design for all other visual elements. The overall visual impact of the D-O LRT Project with the Proposed Refinements in Landscape Unit #3 would remain moderate.

3.4.2.4 Landscape Unit #4 - Interstate (Leigh Village)

Visual impacts of the Previous Design in Landscape Unit #4 are moderate. The Proposed Refinements in this landscape unit that would create a visual change are reconfigured roadways, shifts in track alignment, changes to the ROMF site plan, an underpass at Farrington Road Bridge, and changes to the site plan for Gateway Station. The Proposed Refinements at Gateway Station would require additional tree clearing and three more residential acquisitions than the Previous Design; however, the degree of change for the visual elements would be the same as the Previous Design. Under the Proposed Refinements, the ROMF yard would be elevated by 4 feet. The yard and buildings would still be depressed when compared to Farrington Road. Additional changes to the ROMF building and yard elements (e.g., reduction in number and height of retaining walls) would reduce the visual impact compared to the Previous Design. No other Proposed Refinements in Landscape Unit #4 would result in a change in the visual impacts relative to the Previous Design. The overall visual impact of the D-O LRT Project with the Proposed Refinements in Landscape Unit #4 would remain moderate.

3.4.2.5 Landscape Unit #5 - Suburban Commercial (US 15-501 Corridor)

Visual impacts of the Previous Design in Landscape Unit #5 are moderate to high. The Proposed Refinements in this landscape unit that would create a visual change include shifts in the platform locations and improved pedestrian access at Patterson Place, Martin Luther King Jr. Parkway, and South Square stations, as well as the corresponding alignment changes (see **Figures 2-2 through 2-28**). The Proposed Refinements would change the location and extent of land clearing activities within this landscape unit, but would not change the degree of visual change to related visual elements relative to the Previous Design. The increase in the number of displacements would increase the visual change of that element from minor to moderate. The overall visual impact of the D-O LRT Project with the



Proposed Refinements in Landscape Unit #5 would remain moderate to high.

3.4.2.6 Landscape Unit #6 - Recreational (Duke West Campus)

Visual impacts of the Previous Design in Landscape Unit #6 are moderate. The Proposed Refinements in this landscape unit would reduce tree removal and visual impacts to the Al Buehler Trail and Duke University Golf Club. No other Proposed Refinements would change visual impacts relative to the Previous Design. The overall visual impact of the D-O LRT Project with the Proposed Refinements in Landscape Unit #6 would remain moderate.

3.4.2.7 Landscape Unit #7 - University (Duke West Campus & Medical Center)

Visual impacts of the Previous Design in Landscape Unit #7 are low to moderate. The Proposed Refinements in this landscape unit that would result in a visual change are the shifting of the light rail alignment on a portion of Erwin Road from ground level to an elevated rail structure (see **Figure 2-17** and **2-20**). The elevated alignment would remain within the existing transportation corridor of Erwin Road. The elevated structure would be visually compatible with the adjacent university and medical campus and surrounding multi-story commercial and apartment buildings.

The track would remain elevated from LaSalle Street Station through Duke/VA Medical Centers Station and the remainder of the alignment through this landscape unit. The elevated track and stations would provide new views from the hospitals and adjacent land uses, as well as for pedestrians and the motoring public. The degree of visual change for the elevated visual element would increase from minor (Previous Design) to moderate (Proposed Refinements). Given the existing built environmental setting, the Proposed Refinements would be consistent with the visual environment.

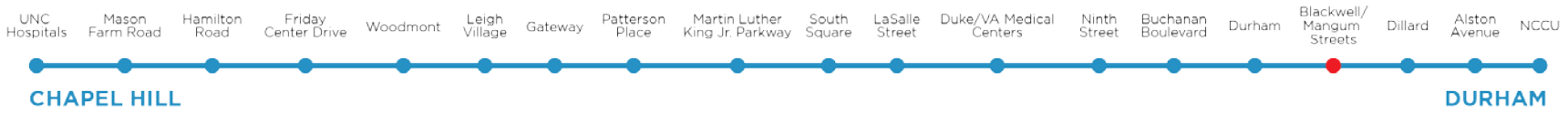
Overall, the degree of visual changes in the University (Duke West Campus and Medical Center) landscape unit would be the same as with the Previous Design. The overall visual impact of the D-O LRT Project with the Proposed Refinements in Landscape Unit #7 would remain low to moderate.

3.4.2.8 Landscape Unit #8 - Historic / Emerging Urban (Old West Durham/Duke East Campus)

Visual impacts of the Previous Design in Landscape Unit #8 are moderate. The Proposed Refinements would shift the location of Ninth Street Station approximately 220 feet to the east and would add a sidewalk on the west side of Erwin Road, but would result in no additional visual impacts or changes in Landscape Unit #8 compared with the impacts of the Previous Design. The overall visual impact of the D-O LRT Project with the Proposed Refinements in Landscape Unit #8 would remain moderate.

3.4.2.9 Landscape Unit #9 - Downtown Urban (Downtown Durham)

Visual impacts of the Previous Design in Landscape Unit #9 are low. The Proposed Refinements in this landscape unit that would create a visual change in the landscape unit include shifts in Buchanan Boulevard and Durham stations and the addition of the proposed Blackwell/Mangum Streets Station (see **Figure 2-24**). The proposed Blackwell/Mangum Streets Station would introduce a new visual element to the area; however, the station would be



consistent with the multi-story, urban character of downtown Durham, including the adjacent passenger/freight rail tracks, the DPAC, and the American Tobacco Campus Warehouse District, which has been historically served by railroads. With the added station and signature civic space approximately mid-block between Blackwell and Mangum streets, the degree of visual change related to transit infrastructure, elevation, trail, streetscape, and lighting in Landscape Unit #9 would increase from minor and moderate with the Previous Design to moderate and substantial for the Proposed Refinements. All other changes to visual elements from the Proposed Refinements would be to the same degree as the Previous Design.

Overall, the Proposed Refinements would result in a moderate visual impact. This represents a change in visual impacts from the effects disclosed in the NEPA documentation for the Previous Design, which were low.

3.4.2.10 Landscape Unit #10 - Urban Industrial (East Durham)

Visual impacts of the Previous Design in Landscape Unit #10 are low to moderate. The Proposed Refinements that would create a visual change in the landscape unit include changes to parking, roadway reconfiguration around Dillard Street and Alston Avenue stations, and shifts in platform locations (see **Figure 2-26 and 2-27**). Six additional residential displacements in this landscape unit would increase the degree of visual change for this visual element from moderate to substantial. The degree of visual change for the parking area would change from substantial with the parking structure included in the Previous Design to moderate with the surface lots of the Proposed Refinements. The overall visual impact of the D-O LRT Project with the Proposed Refinements in Landscape Unit #10 would remain low to moderate.

3.4.2.11 Landscape Unit #11 - Industrial Residential (NCCU)

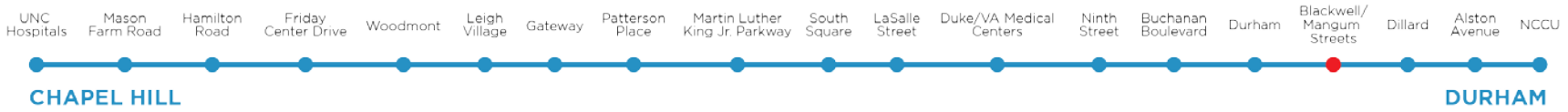
Visual impacts of the Previous Design in Landscape Unit #11 are moderate. The Proposed Refinements that would create a visual change in this landscape unit include modifications along Alston Avenue, pedestrian access improvements, and a reconfiguration of the NCCU Station (see **Figure 2-28**). The roadway modifications along Alston Avenue would create additional visual impacts to the neighborhood relative to the Previous Design with two additional residential displacements. The reconfiguration of the tracks near NCCU Station would have no visual impact. The pedestrian access improvements include aesthetic enhancements and would have no visual impact. The overall visual impact of the D-O LRT Project with the Proposed Refinements in Landscape Unit #11 would remain moderate.

3.4.3 Mitigation

Potential impacts of the Proposed Refinements on visual resources are similar in type and magnitude to those disclosed in the NEPA documentation for the Previous Design and addressed by mitigation commitments included in the Amended ROD; therefore, no additional mitigation measures are proposed.

3.5 Historic and Archaeological Resources

This section describes the potential effects on archaeological and historic resources listed or eligible for listing on the National Register of Historic Places (NRHP) for the Proposed Refinements, as required by the National Historic Preservation Act (36 CFR Part 800). All identification and recommendation of draft assessment of effects of archaeological and historic resources was carried out by persons who meet the Secretary of the Interior's Professional Qualification Standards (see resumes in **appendix F-1.c** and **appendix F-2.d)**.



3.5.1 Affected Environment

This section describes study area, known as the Area of Potential Effects (APE); the background and eligibility review for historic and archaeological resources within the APEs; and the Section 106 Consultation on the subject of the affected environment.

3.5.1.1 Section 106 Consultation

Pursuant to Section 106 of the National Historic Preservation Act (36 CFR 800), the FTA reinitiated consultation with the North Carolina State Historic Preservation Office (SHPO). The FTA and GoTriangle also invited representatives from the North Carolina State Historic Preservation Office (SHPO), Office of State Archaeology (OSA), Preservation North Carolina, Town of Chapel Hill Planning Department, UNC Chapel Hill, Preservation Chapel Hill, Orange County Office of Natural & Cultural Resources, Durham City-County Planning, North Carolina Central University, Preservation Durham, and North Carolina Railroad to participate in a Section 106 consultation meeting (see invitation and subsequent correspondence in **appendix F-4**).On June 5, 2018, the FTA and GoTriangle held a Section 106 consultation meeting, which was attended by representatives of the SHPO and OSA. During the consultation meeting, the FTA and GoTriangle reviewed the proposed revised Area of Potential (APE) Effects for architectural historic resources and archaeological resources. During this meeting, the SHPO concurred with the proposed revised historic APE and the OSA concurred with the revised archaeological resources APE. In addition to the APEs, the FTA and GoTriangle reviewed the draft background and eligibility information about the architectural historic resources (see meeting information in **appendix F-4)**.

3.5.1.2 Area of Potential Effects

The Area of Potential Effects (APE) for each resource type was reviewed using the methodology used in the NEPA documentation for the Previous Design. As a result, the revised APEs have been expanded to include additional areas and resources that could be affected by the Proposed Refinements.

Architectural Historic APE

Figures illustrating the revised historic APE are presented in the Historic Architectural Resources Technical Report in **appendix F-2**. The Proposed Refinements expanded the APE by a total of 75 acres for the linear route.

The draft historic APE was submitted to the State Historic Preservation Office (SHPO) by letter dated May 31, 2018 requesting SHPO review and concurrence (see correspondence in **appendix F-4**). The SHPO confirmed the revised historic APE in a consultation meeting held on June 5, 2018.

Archaeological Resources APE

Figures illustrating the revised APE for archaeological resources, including areas of additional archaeological survey, are presented in the Archaeological Resources Technical Report in **appendix F-1.**

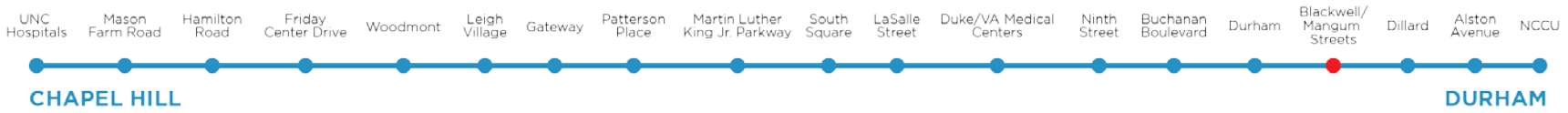
The draft archaeological APE was submitted to the SHPO by a letter dated May 31, 2018 requesting SHPO review and concurrence. The SHPO confirmed the revised archaeological APE in a consultation meeting held on June 5, 2018.

3.5.1.3 Background/Eligibility

Architectural Historic Properties

The revised APE includes the same 26 historic resources described in NEPA documentation for the Previous Design that are listed or have been determined eligible for listing in the NRHP through a the Section 106 process, in consultation with the SHPO.

In addition, GoTriangle conducted a supplemental reconnaissance-level historic architecture survey to identify any additional eligible historic resources



within the revised APE that could be affected by the Proposed Refinements, including individual buildings and districts. If such properties were identified, an intensive-level survey was conducted.

The historic architecture survey identified five new resources in the revised APE. These resources are: Oakwood Park Neighborhood in Orange County, Eastwood Park Neighborhood in Durham County, 5606 Wendell Road, Asbury Temple United Methodist Church, and the Glenview/Woodstock Neighborhood in Durham County. As a result of the reconnaissance survey, the Glenview/Woodstock Neighborhood and Asbury Temple United Methodist Church were recommended eligible by FTA for the NRHP.

Additional information on historic resources and Section 106 correspondence may be found in the Historic Architectural Resources Technical Report in **appendices F-2** through **F-4**. The results of the architectural survey for each resource is summarized below.

Oakwood Park Neighborhood

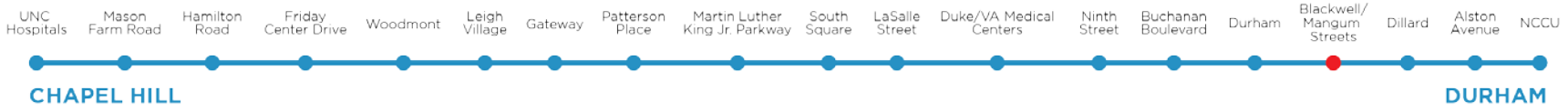
This neighborhood, which dates from 1944, is located along Oakwood Drive and Rogerson Drive north of NC 54 in Orange County. Forty-three houses were surveyed and evaluated in this neighborhood. None of the houses are recommended eligible for the NRHP and the neighborhood is also recommended not eligible as a district under Criteria A, B, C, or D. The property has no known associations with events that have made a significant contribution to the broad patterns of our history, nor does the property appear to be associated with persons significant in history, therefore the property was not evaluated under Criteria A or B. The property was evaluated under Criterion C for architectural significance and it does not appear to possess significance in the area of architecture because the district and houses lack architectural distinction, as well as integrity due to non-historic infill and extensively altered houses. The property does not appear to have the potential to yield significant information about our past, therefore, it was not evaluated under Criteria D. No additional survey work is recommended.

Eastwood Park Neighborhood

This neighborhood, which dates from 1964, is located along Celeste Circle and Nelson Highway in Durham County. Forty-nine houses were surveyed and evaluated in this neighborhood. None of the houses are recommended eligible for the NRHP and the neighborhood is recommended not eligible as a district under Criteria A, B, C, or D. The property has no known associations with events that have made a significant contribution to the broad patterns of our history, nor does the property appear to be associated with persons significant in history, therefore the property was not evaluated under Criteria A or B. The property was evaluated under Criterion C for architectural significance and it does not appear to possess significance in the area of architecture because the district and houses lack architectural distinction, as well as integrity due to non-historic infill and extensively altered houses. The property does not appear to have the potential to yield significant information about our past, therefore, it was not evaluated under Criteria D. No additional survey work is recommended.

5606 Wendell Road

The house at 5606 Wendell Road in Durham County is a ranch house, constructed in 1969. It is recommended not eligible for the NRHP under Criteria A, B, C, or D. The property has no known associations with events that have made a significant contribution to the broad patterns of our history, nor does the property appear to be associated with persons significant in history, therefore the property was not evaluated under Criteria A or B. The property was evaluated under Criterion C for architectural significance and it does not appear to possess significance in the area of architecture because the house lacks architectural distinction as a later-period 1969 Ranch house. The property does not appear to have the potential to



yield significant information about our past, therefore, it was not evaluated under Criterion D. No additional survey work is recommended.

Asbury Temple United Methodist Church

This resource, constructed in 1947, is located at 1120 East Lawson Street in Durham County. This resource is recommended eligible for the NRHP under Criterion A for its association with the Royal Ice Cream Company sit-in, and under Criterion B for its association with Reverend Douglas E. Moore. It is not recommended eligible for the NRHP under Criterion C because the few details present on the building are not distinctive of any architectural style. It is not recommended eligible for the NRHP under Criterion D because it is unlikely that additional study of this property would yield any unretrieved data not discoverable through informant interviews and documentary sources.

Glenview/Woodstock Neighborhood

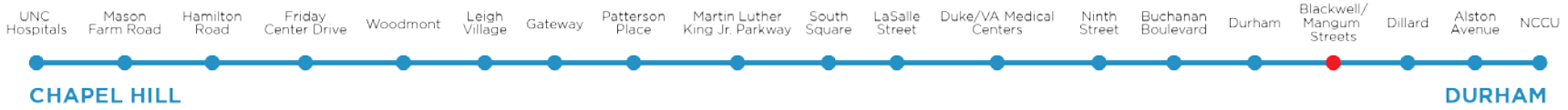
This neighborhood, constructed in the 1950s, is located along the north and south sides of Lawson Street between Alston Avenue and Wabash Street, as well as parts of Rosewood Street in Durham County. The Glenview/Woodstock Neighborhood is historically significant in that it illustrates how Southeast Durham continued its development, which began after the Civil War, as the nexus of black life in the decades prior to the end of legal racial segregation. The physical appearance of the neighborhood mirrors that of white occupied middle-class subdivisions, yet the community derives its local significance as a platted subdivision built for African Americans during segregation. For these reasons, the Glenview/Woodstock Neighborhood is recommended eligible under NRHP Criterion A in the area of local social history. It is recommended not eligible for the NRHP under Criterion B because it is not known to be linked with a specific person of local, state, or national significance. While the neighborhood is physically intact with the exception of the loss of some original building materials, its historic significance is not derived from its plan or design, or the types of houses found there. Larger and more intact examples of this type of post-war Minimal Traditional neighborhoods exist in Durham, such as Northgate Park, and across the state, that better embody the type. The Glenview/Woodstock Neighborhood is recommended not eligible under Criterion C. The neighborhood is recommended not eligible for the NRHP under Criterion D because it is unlikely that additional study of the neighborhood would yield any data not discoverable through informant interviews and documentary sources.

Eligibility Determination

The FTA determined that the two additional historic properties within the revised APE, Asbury Temple United Methodist Church and Glenview/Woodstock Neighborhood, are eligible for listing on the NRHP. The FTA and GoTriangle submitted a Background and Eligibility Report to the SHPO June 29, 2018, requesting concurrence with the findings.

Upon review of the report, the SHPO responded on July 24, 2018 requesting additional information to support the eligibility determination (see correspondence in **appendix F-4**). In response to the SHPO request, GoTriangle collected additional photographs of the Glenview/Woodstock neighborhood and its houses, and reviewed the recommended background research entitled: *Durham Documentation of African American Historic Sites Inventory and Preservation Plan 2009- 2012*, by April M. Johnson.

For the Asbury Temple United Methodist Church, GoTriangle contacted Charity Christian Fellowship, the current owners of the church, to photograph the interior of the church in support of the NRHP eligibility recommendation. GoTriangle photographed the interior of the church on September 23, 2018 (see supplemental memo in **appendix F-2.e**).



GoTriangle provided the requested information to SHPO on September 19, 2018 and October 1, 2018. The SHPO concurred with the FTA eligibility determination verbally and by email October 24, 2018 (see correspondence in **appendix F-4**).

Archaeological Resources

Due to the existing environmental conditions, locations of previous survey work, and low potential for intact archaeological resources, no new archaeological analysis is recommended for areas where the effects of the Proposed Refinements would be minor or in highly developed areas, such as roadways, parking lots, and existing rights-of-way.

Three APE expansion areas were recommended for further archaeological analysis due to the moderate to high probability for archaeological materials: Leigh Village Station, Gateway Station, and a small section on the Duke University campus near the intersection of Erwin Road and LaSalle Street.

A fourth APE expansion area was recommended to cover the area of disturbance associated with the refinement that would relocate the waterline along US 15/501. This area was previously surveyed by a separate NCDOT project and the results of this survey were reviewed by the SHPO (ER 14-1904), and recommended no further analysis. GoTriangle consulted with the North Carolina Office of State Archaeology (OSA) on the proposed APE expansion and confirmed that no additional archaeological investigations are recommended for this fourth APE expansion area.

The three areas surveyed for archaeological resources are summarized below. The survey involved shovel tests, which were conducted using the methodology used in NEPA documentation for the Previous Design. Additional information on the archaeological survey is presented in the Archaeological Resources Technical Report in **appendix F-1**.

Leigh Village Station

Investigations in this area included 48 planned shovel test locations. Of these locations, 18 were not excavated because of existing conditions that included ongoing construction, residential lots, and/or surface water. The remaining 30 shovel tests were negative and did not yield cultural material.

Gateway Station

Investigations in this area included 30 planned shovel test locations. Of these locations, five were not excavated because of modern disturbances such as extant houses, utility lines, and grading and land alteration, or limits of the APE. All of the excavated shovel tests were negative and did not yield cultural material.

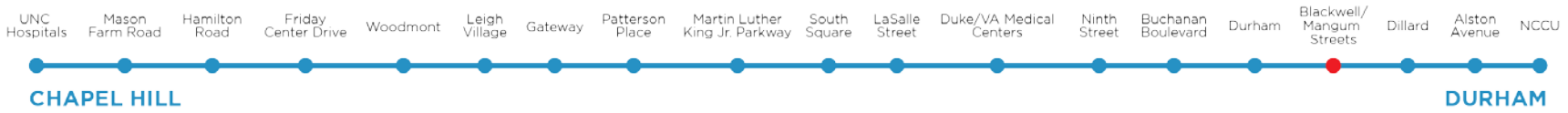
Erwin Road and LaSalle Street

Investigations in this area consisted of the excavation of five shovel tests. All of the shovel tests were negative and did not yield cultural material.

No new archaeological sites were identified during investigations of the revised archaeological APE.

3.5.2 Environmental Consequences

This section describes the effects of the Proposed Refinements on architectural historic properties and archaeological resources relative to the Previous Design. Per the analysis in this Supplemental EA, considering the context and intensity of impacts, and considering all impacts already evaluated and disclosed for architectural historic properties and archaeological resources in the previous NEPA documents, FTA does not anticipate there will be any significant impacts to archaeological or historic resources associated with the Proposed Refinements.



3.5.2.1 Section 106 Consultation

Pursuant to Section 106 of the National Historic Preservation Act (36 CFR 800), the FTA and GoTriangle held a Section 106 consultation meeting with the SHPO on September 24, 2018 to discuss the development of Proposed Refinements in proximity to the American Tobacco Factory Manufacturing Plant and the W.T. Blackwell and Co. "Bull Durham" Tobacco Factory.

In October 2018, the FTA and GoTriangle invited representatives from the SHPO, Office of State Archaeology OSA, Preservation North Carolina, Town of Chapel Hill Planning Department, UNC Chapel Hill, Preservation Chapel Hill, Orange County Office of Natural & Cultural Resources, Durham City-County Planning, North Carolina Central University, Preservation Durham, and North Carolina Railroad to participate in a Section 106 consultation meeting (see invitation and subsequent correspondence in **appendix F-4**).

Section 106 of the NHPA Definitions:

- **No Effects –** If a project or activity is determined not to have the potential to cause effects (either direct or indirect) on historic properties, there are no further obligations under Section 106 or the ACHP regulations.
- **No Adverse Effects –** If a project or activity is determined, in consultation with the SHPO/THPO, to have no adverse effect (either direct or indirect) on an historic property, the agency proceeds with the undertaking and any agreed-upon conditions.
- **Adverse Effects –** If a project would directly or indirectly alter characteristics of a historic property that qualify it for inclusion in the NRHP, the project sponsor must seek ways to avoid, minimize, or mitigate the adverse effects in consultation with the SHPO/THPO. With these efforts, a finding of adverse effect on a historic property does not necessarily require an EIS under NEPA. That is, an adverse effect does not necessarily rise to the level of NEPA significance.

3.5.2.2 Architectural Historic Properties

Newly Identified Sites

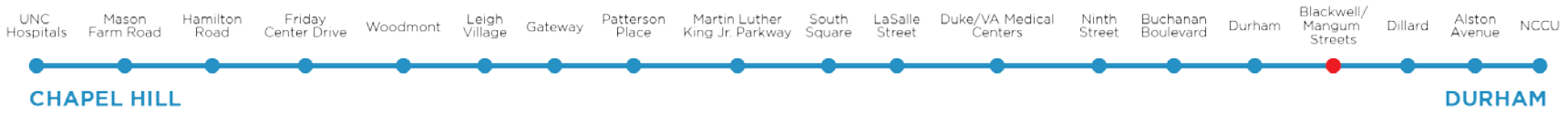
Asbury Temple United Methodist Church

The Proposed Refinements consist of the construction of a 6-foot-wide sidewalk and a three-foot-wide buffer on the south side of E. Lawson Street from Alston Avenue to Wabash Street. This work will occur within the recommended NRHP boundary. There is presently no sidewalk along this segment of E. Lawson Street. The proposed sidewalk along the north side of the church property would not alter or diminish its association with the historical events or Reverend Moore.

The FTA has made a preliminary determination, in consultation with the SHPO, that the Proposed Refinements will have no adverse effect on the Asbury Temple United Methodist Church.

Glenview/Woodstock Neighborhood

The Proposed Refinements consist of the construction of a 6-foot-wide sidewalk and a three-foot-wide buffer on the south side of E. Lawson Street from Alston Avenue to Wabash Street. This work will occur within the recommended NRHP boundary. There is presently no sidewalk along this segment of E. Lawson Street. Construction of the



proposed sidewalk will not diminish its association with the historical events that make it eligible for the NRHP.

The FTA has made a preliminary determination, in consultation with the SHPO, that the Proposed Refinements will have no adverse effect on the Glenview/ Woodstock Neighborhood.

Previously Identified Sites

The following discussion presents a brief summary of previously identified NRHP-listed and NRHP-eligible historic properties in the revised APE that could be affected by the Proposed Refinements. The discussion describes the changes from the Previous Design to the Proposed Refinements. As described below in **Table 3-6**, the FTA has made a preliminary determination, in consultation with the SHPO, that the Proposed Refinements would have either no effect or no adverse effect on any historic properties within the APE. A detailed evaluation of effects is presented in **appendix F-3**.

H.G. Baity House (OR-2772)

The Proposed Refinements consist of improving the sidewalk in front of the H.G. Baity House. The potential effects of the Proposed Refinements would be similar to those previously disclosed in the NEPA documentation of the Previous Design. Therefore, the FTA has made a preliminary determination in consultation with the SHPO that the Proposed Refinements would have no effect on the H.G. Baity House.

Highland Woods Historic District (OR-1460)

The Proposed Refinements consist of a multi-use path between the light rail tracks and the historic district, but not within the historic district. The potential effects of the Proposed Refinements would be similar to those previously disclosed in the NEPA documentation of the Previous Design. Therefore, the FTA has made a preliminary determination in consultation with the SHPO that the Proposed Refinements would have no adverse effect on the Highland Woods Historic District.

Walter Curtis Hudson Farm (DH-2373)

The Walter Curtis Hudson Farm (DH-2373) is adjacent to the ROMF site. The Proposed Refinements would reduce the amount of property needed for construction at the ROMF site in proximity to the historic district. The proposed ground disturbance would be greater than 350 feet from the closest contributing resource of the historic district, and the nearest temporary impacts would be due to realignment of the driveway/access road leading into the property. Additionally, there will be a retaining wall that will require anchoring, using soil nails, in a subsurface easement within the limits of the historic property. However, due to the 4-foot increase in elevation of the ROMF yard, the depth of the nails in the soil nail wall will decrease and the height of the retaining walls in the yard will decrease. This anchoring will not be visible and the ROMF yard will still be depressed compared to the elevation of Farrington Road. There will be no adverse effect to the historic property. The FTA has made a preliminary determination in consultation with the SHPO that none of the Proposed Refinements at this location would change the effects disclosed in the NEPA documentation for the Previous Design with respect to the Walter Curtis Hudson Farm.

Ruth-Sizemore Store (DH-2561)

The Proposed Refinements would move the alignment slightly closer to the historic resource; however, the alignment would still be approximately 200 feet away from the closest contributing element. The potential effects of the Proposed Refinements would be similar to those previously disclosed in the NEPA documentation of the Previous Design. Therefore, the FTA has made a preliminary determination in consultation with the SHPO that the Proposed Refinements would have no adverse effect on the Ruth-Sizemore Store.

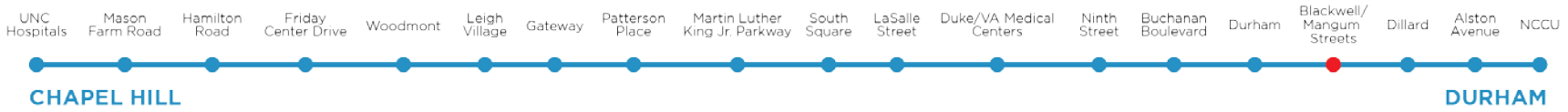


Table 3-6: Recommended Effects to Previously Recorded NRHP Listed and Eligible Historic Properties in the D-O LRT Project Revised APE

Name (NC HPO Survey Number)	NRHP Listing or DOE and Date	NRHP Criteria and Significance	Previous Design Effects Determination	Draft Determination of Effects for the Proposed Refinements
H.G. Baity House (OR 2772)	DOE 2015	Determined eligible under Criterion B for its association with sanitation engineer H.G. Baity and Criterion C for its Chateauesque-style architecture.	No Effect	No Effect
Walter Curtis Hudson Farm (DH 2373)	DOE 2015	Determined eligible under Criterion C as representative of a small Durham County farmstead of early twentieth century.	No Adverse Effect	No Adverse Effect
Highland Woods Historic District (OR-1460)	DOE 2015	The neighborhood was determined eligible under Criterion A within the area of community planning and development and Criterion C for the Mid-Century Modernist architecture associated with the district.	No Adverse Effect	No Adverse Effect
Ruth-Sizemore Store (DH 2561)	DOE 2015	Store determined eligible under Criterion A in the area of significance of commerce as representative of a rural Durham County store.	No Effect	No Adverse Effect
Smith Warehouse (DH 89)	NRHP listed 1985	Significant under Criteria A, B, and C for connection with American Tobacco Company trust and economic role in Durham; association with James B. Duke and other American Tobacco Company executives; and for architecture.	No Adverse Effect	No Adverse Effect
Duke Memorial United Methodist Church (DH 1253)	NRHP listed 1985	Significant under Criteria A, B, and C for association with rapid growth of western Durham and many tobacco workers in congregation; association with Washington Duke and sons; and for architecture.	No Adverse Effect	No Adverse Effect
North Carolina Mutual Building (DH 2477)	DOE 2015	Determined eligible under Criterion A in the area of African-American ethnic history for association with North Carolina Mutual Insurance Company.	No Adverse Effect	No Adverse Effect

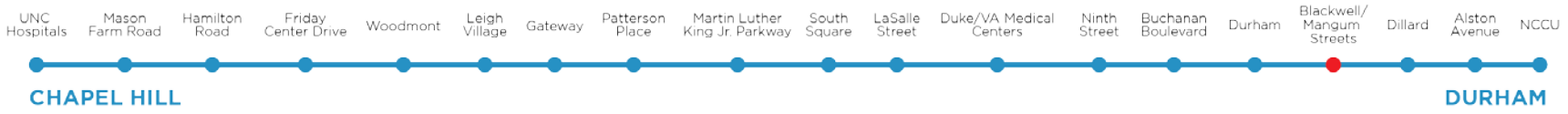


Table 3-6 (Cont'd): Recommended Effects to Previously Recorded NRHP Listed and Eligible Historic Properties in the D-O LRT Project Revised APE

Name (NC HPO Survey Number)	NRHP Listing or DOE and Date	NRHP Criteria and Significance	Previous Design Effects Determination	Draft Determination of Effects for the Proposed Refinements
American Tobacco Company Manufacturing Plant (DH 1872 and DH 10)	NRHP listed 2000	American Tobacco Company Manufacturing Plant (DH1872) significant under Criterion A in the area of industry and Criterion C in the area of architecture. W.T. Blackwell and Co. (Bull Durham) Tobacco Factory (DH-10) at north end of property declared a National Historic Landmark in 1974.	No Adverse Effect	No Adverse Effect
Downtown Durham Historic District (DH-1692) and North Carolina Mutual Life Insurance/ Mechanics and Farmers Bank building (DH-14)	NRHP listed 1977	Downtown Durham Historic District (DH-1692) significant for Architecture, Commerce, Politics/Government, Religion, and Theater. Included within the district is the North Carolina Mutual Life Insurance/Mechanics and Farmers Bank building (DH-14), which was listed as a National Historic Landmark in 1975. The historic district appears to retain its significance and integrity and to continue to merit National Register listing	No Adverse Effect	No Adverse Effect
Southern Railway Bridge (Seaboard Coastline Railroad Overpass) (DH 2504 and DH 1067)	DOE 1999	Determined eligible under Criterion A in area of significance of transportation and Criterion C for design.	No Adverse Effect	No Adverse Effect
Venable Tobacco Company Warehouse (DH 97)	NRHP listed 1985	Significant under Criterion A in the area of industry and Criterion C in the area of architecture.	No Adverse Effect	No Adverse Effect

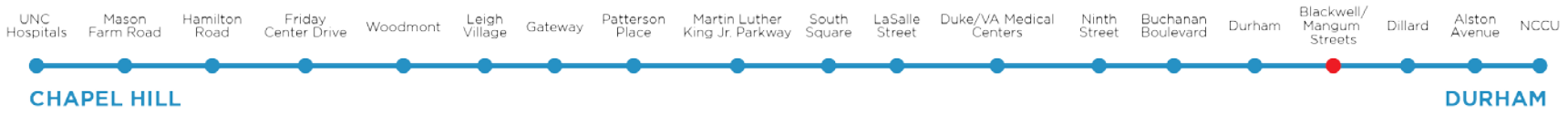
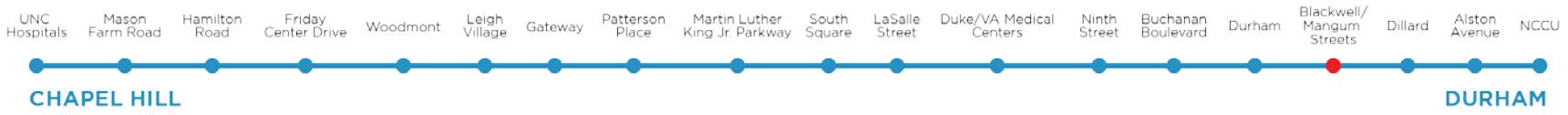


Table 3-6 (Cont'd): Recommended Effects to Previously Recorded NRHP Listed and Eligible Historic Properties in the D-O LRT Project Revised APE

Name (NC HPO Survey Number)	NRHP Listing or DOE and Date	NRHP Criteria and Significance	Previous Design Effects Determination	Draft Determination of Effects for the Proposed Refinements
Durham Water Tower and Valve House (DH 3508)	DOE 2015	Determined eligible under Criterion A for association with activities of Federal Emergency Administration of Public Works in Durham and Criterion C for water tower design.	No Adverse Effect	No Effect
Russell Memorial CME Church (DH 3663)	DOE 2016	Significant under Criterion C in the area of architecture.	No Adverse Effect	No Adverse Effect



Smith Warehouse (DH-89)

The Proposed Refinements would require slightly changing a portion of the sidewalk next to the warehouse. The FTA has made a preliminary determination in consultation with the SHPO that the anticipated effects relating to the Proposed Refinements would have minimal differences from the effects disclosed for the Previous Design and that the Proposed Refinements would have no adverse effect on the Smith Warehouse.

Duke Memorial United Methodist Church (DH-1253)

The Proposed Refinements would require the modification of the sidewalk in front of the church. The FTA has made a preliminary determination in consultation with the SHPO that the anticipated effects relating to the Proposed Refinements would have minimal differences from the effects previously disclosed in the effects determination for the Previous Design and that the Proposed Refinements would have no adverse effect on the Duke Memorial United Methodist Church.

North Carolina Mutual Building (DH-2477)

The Proposed Refinements would require the modification of the sidewalk in front of the building. The FTA has made a preliminary determination in consultation with the SHPO that the anticipated effects relating to the Proposed Refinements would have minimal differences from the effects disclosed for the Previous Design and that the Proposed Refinements would have no adverse effect on the North Carolina Mutual Building.

American Tobacco Company Manufacturing Plant and W.T. Blackwell Tobacco and Company (Bull Durham) Tobacco Factory (DH-1872 and DH-10)

The Proposed Refinements would add the Blackwell/Mangum Streets Station, which is a center platform station near the DPAC located between Blackwell and Mangum Streets. Sidewalk alignment changes would occur as a result of the shifting of Pettigrew Street.

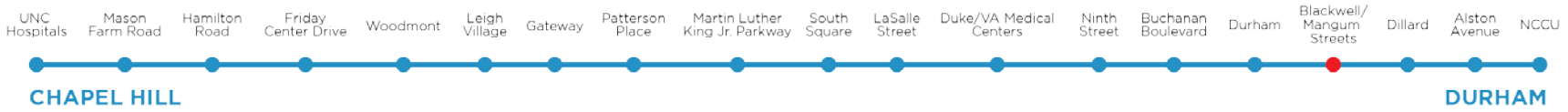
As part of the engineering design of light rail track in this location, GoTriangle examined the roadway configurations relative to the existing NCRR rail line and the planned light rail line crossings. In order to accommodate vehicles on Blackwell Street/Corcoran Street and provide a crossing of both rail lines, Pettigrew Street would need to be raised.

Raising Pettigrew Street at Blackwell Street would require the addition of several large retaining walls in front of the W.T. Blackwell and Co. “Bull Durham” Tobacco Factory (National Historic Landmark). The retaining walls would have adversely affected both DH-1872 and DH-10.

To minimize impacts to these resources and improve safety, GoTriangle proposes to close the Blackwell Street crossing to vehicles, pedestrians, and bicycles between Pettigrew and Ramseur streets. Pettigrew Street would be raised starting east of Blackwell/Mangum Street Station and continuing to Grant Street.

Alternative vehicular connections would be provided with the proposed two-way Ramseur Street configuration for east-west traffic and the intersecting roadways for north and southbound traffic. While some pedestrian and bicycle traffic may use other parallel roadways, the proximity of the proposed Blackwell/Mangum Street station will also increase demand for pedestrian and bicycle travel. GoTriangle evaluated ways to restore pedestrian and bicycle connectivity while minimizing impacts to the historic resources.

The FTA and GoTriangle consulted with the SHPO on September 24, 2018 to present the potential alternatives for addressing the pedestrian/bicycle connection while still minimizing impacts to the historic resources. The alternative that met the purpose and need and minimized potential effects to historic



resources involves constructing a signature civic space that would connect Pettigrew Street to Ramseur Street. Based on feedback from the FTA and the SHPO, the signature civic space should be located approximately mid-block between Blackwell Street and Mangum Street to allow for preservation of the views along Pettigrew Street to the historic resources. The SHPO also provided feedback that ramps or vertical circulation connections could be provided near Blackwell Street and Vivian Street to the south and near Corcoran and Ramseur Street to the north to facilitate direct access to Blackwell/Corcoran Streets.

GoTriangle will develop the design of the proposed signature civic space using community input through an open public process. The FTA and GoTriangle will continue to consult with the SHPO as the aesthetic design is developed.

The FTA has made a preliminary determination that the Proposed Refinements would result in no adverse effect to the American Tobacco Company Manufacturing Plant (DH-1872), which contains the W.T. Blackwell Tobacco and Co. (Bull Durham) Tobacco Factory (DH-10), a National Historic Landmark.

Downtown Durham Historic District (DH-1692) and North Carolina Mutual Life Insurance/Mechanics and Farmers Bank building (DH-14)

The Proposed Refinements would convert Ramseur Street to a two-way street to allow bus traffic to use Ramseur Street and Chapel Hill Street to access the Durham Bus Station. Dillard Street would be converted to one-way southbound only at the NCRR crossing between Chapel Hill Street and Dillard Street to improve vehicle and bus access in the westbound direction (see **Figures 2-24** and **2-26**; also see **appendix A-3**, Sheets 29-31). The reconfiguration of the street would occur within the existing right of way for the road. The reconfiguration of Ramseur Street to a two-way street would occur near the Downtown Durham Historic District (DH-1692) and North Carolina Mutual Life Insurance/Mechanics and Farmers Bank building (DH-14), a National Historic Landmark.

The Blackwell Street closure between Pettigrew and Ramseur streets would also be in the vicinity of these historic resources. GoTriangle proposes to construct a signature civic space connecting Pettigrew Street to Ramseur Street, located approximately mid-block between Blackwell Street and Mangum Street. GoTriangle will develop the aesthetic design of the signature civic space using community input through an open public process.

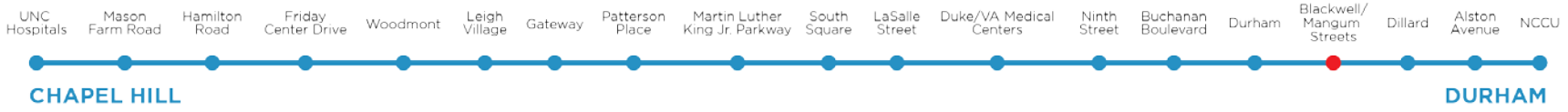
The FTA, has made a preliminary determination that the Proposed Refinements would result in no adverse effects to Downtown Durham Historic District (DH-1692) and North Carolina Mutual Life Insurance/Mechanics and Farmers Bank building (DH-14), a National Historic Landmark.

Southern Railway Bridge (Seaboard Coastline Railroad Overpass) (DH-2504 and DH-1067)

The Proposed Refinements would add the Blackwell/Mangum Streets Station, which would create sidewalk alignment changes as a result of shifting Pettigrew Street in the vicinity of the railway bridge. The reconfiguration of Ramseur Street to a two-way street would also occur in the vicinity of the railway bridge. The FTA has made a preliminary determination in consultation with the SHPO that the potential effects of the Proposed Refinements would have minimal differences from the effects previously agreed to in the effects determination and the Proposed Refinements would have no adverse effect on the Southern Railway Bridge.

Venable Tobacco Company Warehouse (DH-97)

A proposed refinement would widen the existing sidewalk in proximity to the Venable Tobacco Company Warehouse (DH-97). The reconfiguration of Ramseur



Street to a two-way street would also occur in the vicinity of this resource. The FTA has made a preliminary determination in consultation with the SHPO that the effects of the Proposed Refinements would have minimal differences from the effects disclosed and that the Proposed Refinements would have no adverse effect on the Venable Tobacco Company Warehouse.

Durham Water Tower and Valve House (DH-3508)

FTA previously determined that the Previous Design of a proposed structured parking deck would have no adverse effect on the Durham Water Tower. In the Proposed Refinements, the parking deck would be eliminated and replaced with surface parking, thereby eliminating the effects to the Water Tower. Therefore, the FTA has made a preliminary determination in consultation with the SHPO that the Proposed Refinements would have no effect to the Durham Water Tower and Valve House.

Russell Memorial CME Church (DH-3663)

The Proposed Refinements would involve filling the grassed gap between the sidewalk and the back of the curb line with sailor brick pavers in order to widen the sidewalk without affecting the retaining wall in front of the church. The construction limits of the Proposed Refinements would not extend into the NRHP-eligible boundary. For this reason, the FTA has made a preliminary determination that the Proposed Refinements would have no adverse effect on the Russell Memorial CME Church.

3.5.2.3 Archaeological Resources

The Proposed Refinements that could affect archaeological sites within the APE are described in detail in the Archaeological Resources Technical Report in **appendix F-1**.

The archaeological resources identified in the APE for the Previous Design are the same as those that could be affected by the Proposed Refinements. No new archaeological sites were identified during investigations of the revised archaeological APE.

FTA previously determined the effects of the Previous Design would have no effect or no adverse effect on archaeological resources. As described in **appendix F-1**, the FTA has made a preliminary determination, in consultation with the SHPO, that the Proposed Refinements would have either no effect or no adverse effect on any archaeological sites within the APE. Consultation with the SHPO is ongoing.

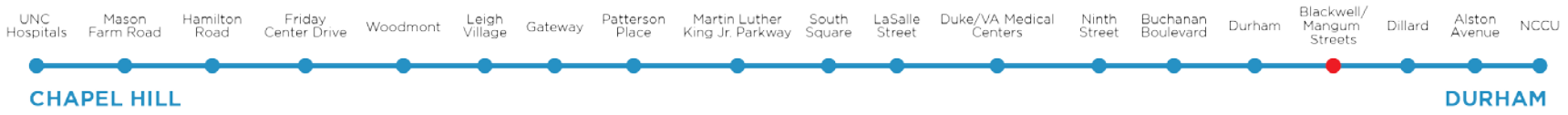
3.5.3 Mitigation Measures

In consultation with the SHPO, FTA has made a preliminary determination that the Proposed Refinements would eliminate the effect to the Durham Water Tower and Valve House. As such, any commitments from the prior Amended ROD that pertain to the Durham Water Tower and Valve House will be modified as necessary in the Final Agency Action.

The Memorandum of Agreement (MOA) developed for the D-O LRT Project addresses the procedures by which FTA, GoTriangle, and SHPO will work together to ensure the effective protection of historic architectural, cultural, and archaeological resources during the implementation and construction of the proposed D-O LRT Project. The MOA signed by FTA on February 2, 2016 remains unchanged.

3.6 Parklands and Recreational Areas/Section 6(f)

This section describes the publicly and privately-owned parks, recreational facilities, greenways/trails, and natural areas used for recreational purposes within the D-O Corridor and the potential impacts of the Proposed Refinements on these resources and how impacts differ from those evaluated in the NEPA documentation of the Previous Design.



The Proposed Refinements would not affect Section 6(f) properties.

Section 6(f) of the Land and Water Conservation Act requires that the conversion of lands or facilities acquired through Land and Water Conservation Fund (LWCF) programs must be coordinated with the Department of Interior. Replacement in kind for these lands is normally required.

3.6.1 Affected Environment

The existing and planned parks and recreational resources identified in the NEPA documentation for the Previous Design were reviewed for potential effects from the Proposed Refinements. One additional existing recreational area and one planned recreational area were identified as resources that could be affected by the Proposed Refinements: the Downtown Durham Trail (existing), which is located on the sidewalk of Blackwell Street in the area of the proposed Blackwell/Mangum Streets Station; and the Durham Beltline Trail (planned), which is a planned 1.75 mile trail connecting Avondale Drive to Downtown Durham, near Chapel Hill Street and Great Jones Street/Ramseur Street.

3.6.2 Environmental Consequences

The NEPA documentation for the Previous Design identified impacts to parks, recreational areas, and trails, which are summarized in **Table 3-7**. **Figures 3-10 and 3-11** show the locations of the parks, recreational areas, and trails.

The Proposed Refinements include alignment shifts and design details that result in changes to the previously reported impacts to seven of these existing recreation areas and one planned recreation area (see **Table 3-7**).

In light of the analysis in this Supplemental EA, considering the context and intensity of impacts, and considering all impacts already evaluated and disclosed for parklands and recreational areas in the previous NEPA documents, FTA does not anticipate there will be any new significant impacts associated with the Proposed Refinements.

3.6.2.1 Existing Facilities

UNC Coker Pinetum

The Proposed Refinements would include an 8-foot southward track shift (for the westbound track only) and result in minor changes in impacts to the UNC Coker Pinetum relative to the Previous Design, resulting in an increase in permanent easement from 0.2 acres to 0.4 acres. This change would not adversely affect the user's experience of the property. The change would only affect the location of the impact, shifting it eight feet to the south.

UNC Open Space

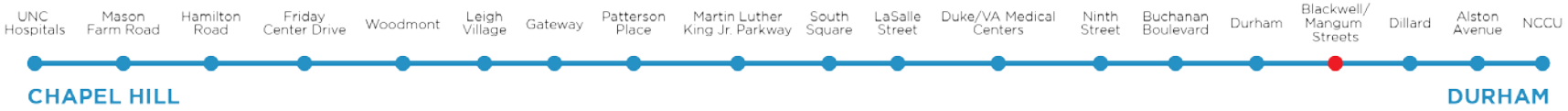
The Proposed Refinements would cross the UNC Open Space along a similar alignment as the Previous Design, but would result in a 1.6-acre permanent easement increase to the property due to the widening of walkways, enhanced drainage improvements, and the addition of a multi-use path.

UNC Finley Golf Course and Athletic Fields

The Proposed Refinements would add a sidewalk and multi-use path in the vicinity of the Hamilton Road Station and would reduce the area of impact to the UNC Finley Golf Course and Athletic Fields relative to the Previous Design. The Proposed Refinements would require approximately 2.3 acres of permanent easement, representing a 0.3-acre reduction in easement needs.

USACE Land (Jordan Game Lands)

The Proposed Refinements would use the Jordan Game Lands similar to the Previous Design, but would include increases in both temporary and permanent easements. The Proposed



Refinements would require 0.3 acre of temporary easements within the existing NCDOT easement; 1.7 acres of temporary construction easement; 1.7 acres of permanent easement within the existing NCDOT easement; and, 0.4 acre of new permanent easements. As a result the impact area would increase from 3.3 acres in the Previous Design to 4.1 acres with the Proposed Refinements.

Al Buehler Trail/Duke University Golf Club

The Previous Design included elevated track over the Al Buehler Trail. Based on advancements in design included in the Proposed Refinements, the portion of the Al Buehler Trail in the area of the elevated track would need to be relocated.

The Proposed Refinements would shift the light rail alignment closer to US 15-501 from Cornwallis Road to Cameron Boulevard so that trees can be maintained in the area between US 15-501 and the Duke University property, which includes the Al Buehler Trail and the Duke University Golf Club (privately maintained parklands). The alignment shift would enhance visual screening for users of the trail and the golf course relative to the Previous Design.

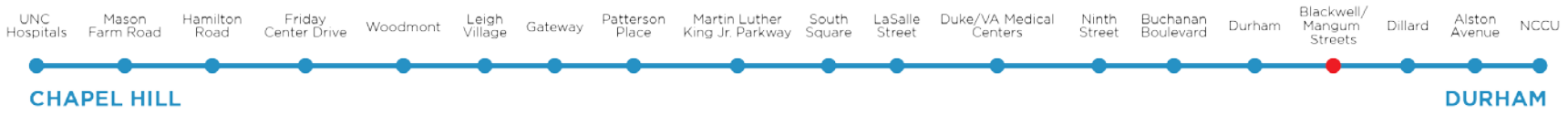
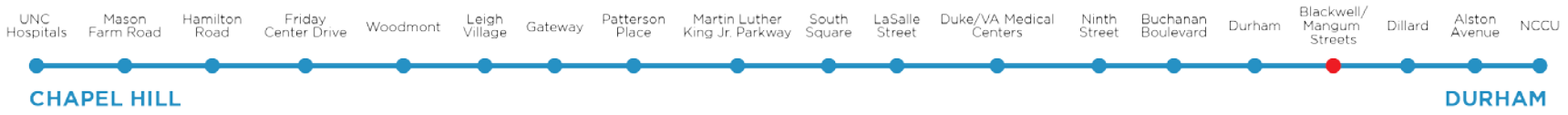


Table 3-7: Summary of Potential Impacts on Parks and Recreational Areas

Resource	Previous Design (Acres of Impact)	Proposed Refinements (Acres of Impact)
Existing Facilities		
UNC Coker Pinetum	0.2	0.4
UNC Open Space	0.8	2.4
UNC Finley Golf Course and Athletic Fields	2.6	2.3
USACE Lands (Jordan Game Lands)	3.3	4.1
Duke University Golf Club	5.6	0.8
Al Buehler Cross Country Trail	0	<0.1
Downtown Durham Trail	0	Shifting over proposed signature civic space / 0.12-mile segment of trail
R. Kelly Bryant Bridge Trail	0	Improved access to the trail from Alston Avenue / 0
Planned Facilities (Owner)		
UNC Central Park South	0.9	1.9
East 54 Trail/NC Botanical Gardens Access (by UNC)	0	No impact: multi-use path would accommodate trail / 0
Little Creek Connector Trail (City-County of Durham)	0	No change from Previous Design
New Hope Creek Trail (USACE and the City-County of Durham	<0.1	No change from Previous Design
Durham Belt Line	0	No impact
Total Acres	10.3	9.3

Note: Duke University Golf Club and Al Buehler Cross Country Trail are privately maintained parklands [not Section 4(f) protected parklands.] Previous Design acres of impact for all properties other than Duke University Golf Course and Al Buehler Cross Country Trail were obtained from the previous NEPA documentation. Acres of impact to the Al Buehler Cross Country Trail are a preliminary estimate based on advancements in design of the elevated track at that location.



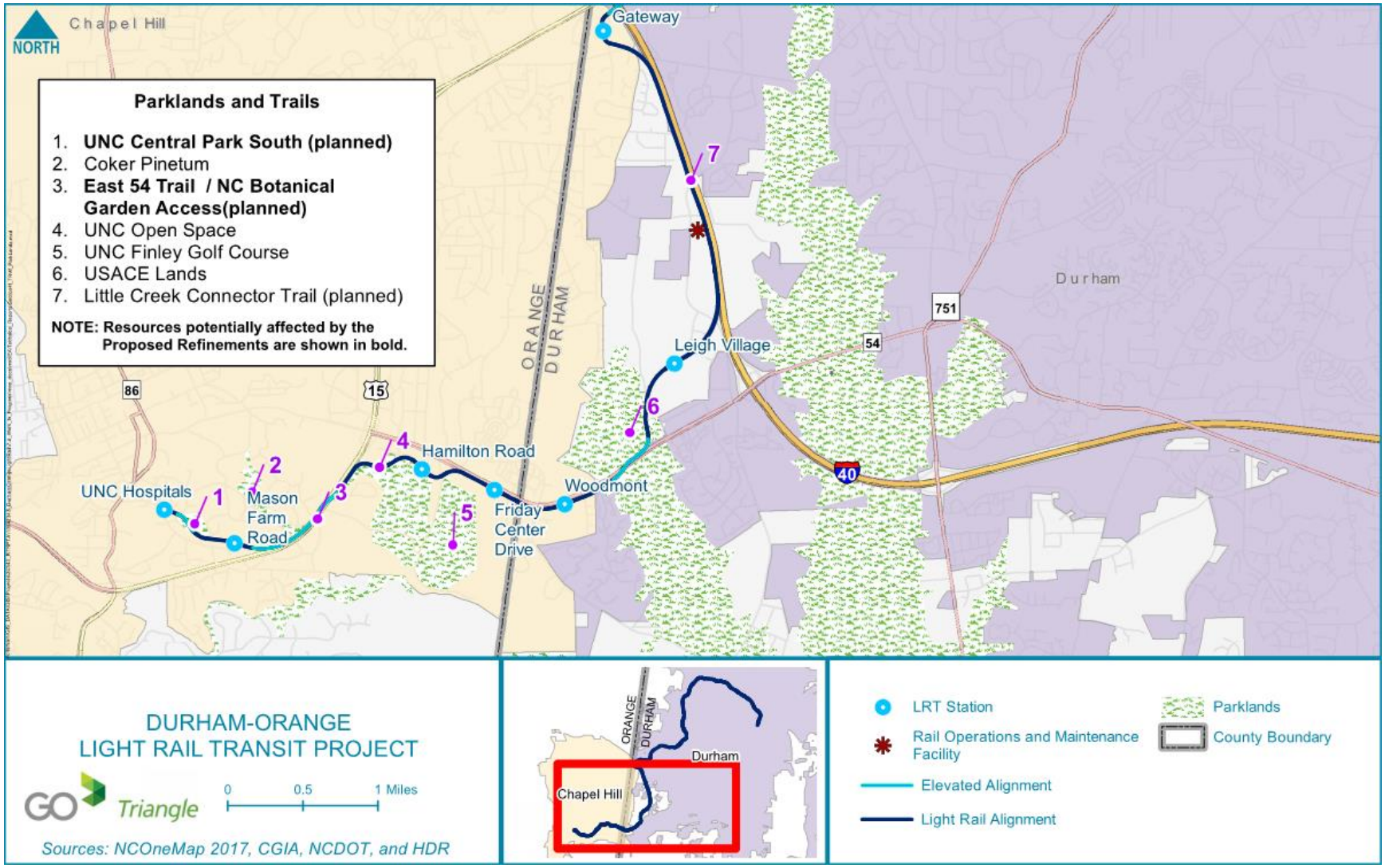
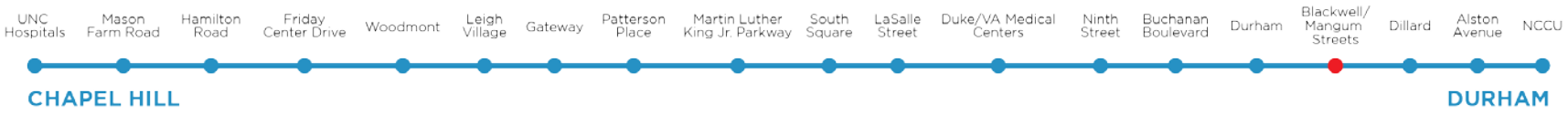


Figure 3-10: Parklands and Recreation Resources (1 of 2)



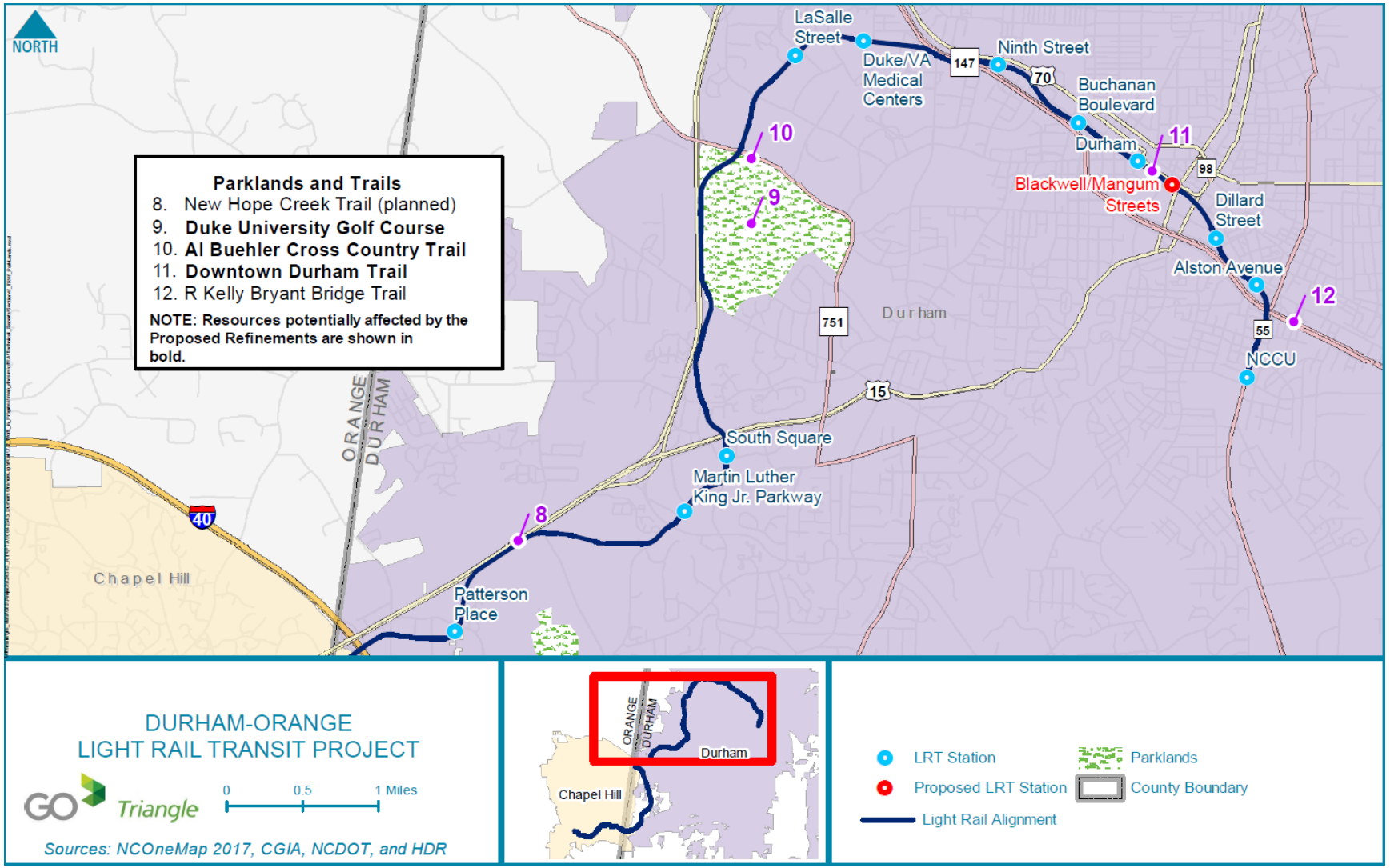
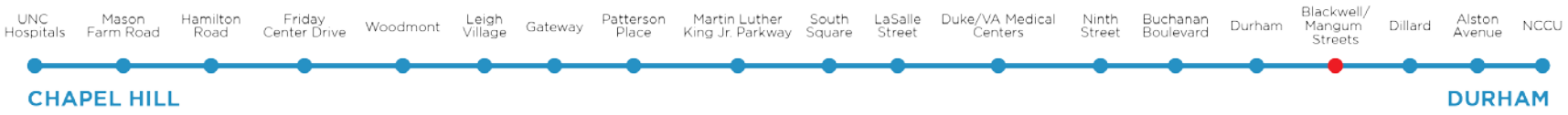


Figure 3-11: Parklands and Recreation Resources (2 of 2)



Downtown Durham Trail

The Proposed Refinements would close Blackwell Street to vehicle, bicycle, and pedestrian access between Pettigrew Street and Ramseur Street and add a signature civic space approximately mid-block between Blackwell Street and Mangum Street. Construction of the light rail alignment along Pettigrew Street and the construction of the proposed signature civic space would temporarily affect the Downtown Durham Trail. The connectivity of the trail would be maintained during construction by providing a signed detour route. The detour during construction would be temporary in duration and would be restored at the completion of construction. The Proposed Refinements would not adversely affect the activities, features, or attributes qualifying the trail for protection under Section 4(f) (see **chapter 4**).

R. Kelly Bryant Bridge Trail

The R. Kelly Bryant Bridge Trail is a bicycle and pedestrian trail that features the R. Kelly Bryant Bridge, which provides pedestrian and bike passage over NC 147. The City of Durham has plans to expand the trail to approximately 3 miles long, connecting it with the existing Rocky Creek Trail on Dakota Street north to the Drew/Granby Park located on Drew Street in Durham. The Proposed Refinements would have no direct impacts on the existing or planned trail but would improve the access to this facility from Alston Avenue with a multi-use path, lighting, and wayfinding.

3.6.2.2 Planned Facilities

UNC Central Park South (Planned)

The UNC Central Park South is a planned public park within UNC jurisdiction and would be affected by the Proposed Refinements. To accommodate replacement parking provisions and roadway design changes, GoTriangle would acquire an additional 1.0 acre of land from the planned UNC Central Park South, resulting in a total of 1.9 acres of permanent easement. The parcels on which the park would be constructed are currently occupied by former residence halls (Odum Village) and undeveloped land. Pursuant to the UNC Master Plan, UNC is demolishing the residence halls. A construction timeline for the UNC Central Park South is not yet determined. The Proposed Refinements do not preclude construction of the park. UNC Central Park South would maintain its intended utility and functionality even with the presence of the light rail.

NC Botanical Garden Access Trail (Planned)

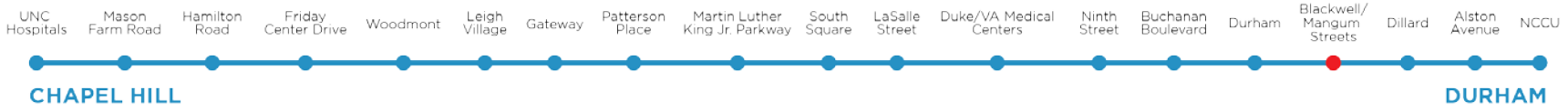
UNC also intends to construct the East 54/NC Botanical Garden Access Trail, a trail that would originate near the Coker Pinetum and would run adjacent to NC54. The project's proposed multi-use path between Mason Farm Road and Prestwick Road would accommodate the planned East 54/NC Botanical Gardens Access Trail, as no new easements would be required and there would be no adverse effect to the East 54/NC Botanical Gardens Access Trail. Construction of the East 54 Trail/NC Botanical Gardens Access has not been scheduled by UNC; however, the Proposed Refinements would not preclude its development.

Little Creek Connector Trail (Planned)

The Proposed Refinements would not change the impacts to the planned Little Creek Connector Trail described in the Previous Design.

New Hope Creek Trail (Planned)

The single-track alignment from SW Durham Drive to Snow Crest Trail would result in a single-track bridge structure across New Hope Creek. This structure is narrower than the double-track bridge in the Previous Design and would require fewer pier footings in the New Hope Creek. Additionally, the single-track structure would avoid the need to relocate the City of Durham's 16-inch waterline in the New Hope Creek Bottomlands. The resulting impacts to the



New Hope Creek Trail (Planned) would be less than in the Previous Design.

Durham Belt Line (Planned)

The alignment would not cross the Durham Beltline Trail (planned) and would therefore not directly affect the planned trail. The Proposed Refinements include changes to the configuration of Ramseur Street between Chapel Hill Street and Dillard Street to allow two-way traffic. The Proposed Refinements would facilitate access to the planned Durham Belt Line trail gateway entrance near Great Jones/Ramseur Street.

3.6.3 Mitigation Measures

The mitigation commitments identified in the Amended ROD remain applicable to the Proposed Refinements.

Planned parks and recreation facilities that are developed prior to the D-O LRT Project would be treated with the same mitigation commitments as existing facilities.

GoTriangle will coordinate with Duke University on the design of the relocated portions of the Al Buehler Trail. During construction, GoTriangle will coordinate with Duke University to notify trail users of any temporary closures due to construction.

GoTriangle proposes to construct a signature civic space connecting Pettigrew Street to Ramseur Street, located approximately mid-block between Blackwell Street and Mangum Street. The signature civic space would maintain pedestrian and bicycle connectivity altered by the closure of Blackwell Street. GoTriangle will develop the aesthetic design using community input through an open public process.

3.7 Natural Resources

This section describes the existing conditions of natural resources, the potential impacts of the Proposed Refinements on those resources and how impacts differ from those evaluated in the NEPA documentation of the Previous Design. Additional information is included in **appendix G**, Proposed Refinements Natural Resources Technical Report.

3.7.1 Affected Environment

Existing natural resources in the Proposed Refinements study area include: soils, terrestrial communities, terrestrial wildlife, aquatic communities, bottomland hardwood forest wildlife, and protected species. No new types of terrestrial communities, terrestrial wildlife, aquatic communities, or bottomland hardwood forest communities (outside those previously identified in the previous NEPA documentation) occur in the Proposed Refinements study area.

Except where described below, existing natural resources are expected to be the same for the Proposed Refinements as described were identified in the NEPA documentation for the Previous Design:

- **Soils**: Five new soil types were identified in the area of the Proposed Refinements.
- **Threatened and Endangered Species / Endangered Species Act Candidate Species:** As of June 27, 2018, the U.S. Fish and Wildlife Service (USFWS) lists four federally protected species in the two-county study area (see **Table 3-8**) of the Proposed Refinements. Three of these species were described in the NEPA documentation for the Previous Design. The Cape Fear shiner was not previously listed for Orange County and the red-cockaded woodpecker, which also was described in the NEPA documentation for the Previous Design, is no longer listed under the Endangered Species Act in Durham or Orange Counties. As noted in NEPA documentation for the Previous Design, the Northern long-eared bat remains unlisted for Durham or Orange Counties.

  Of the four species protected under the Endangered Species Act (see **Table 3-8**), Michaux's sumac and smooth coneflower have the potential to occur within the Proposed Refinements study area.

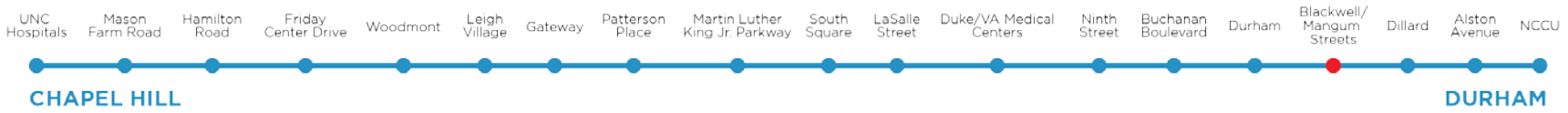


Table 3-8: Federally Protected Species listed for Durham and Orange Counties

Scientific Name	Common Name	Federal Status	Habitat Present	Biological Conclusion	County
Echinacea laevigata	Smooth coneflower	E	No	No Effect	Durham/Orange
Rhus michauxii	Michaux's sumac	E	Yes	May Affect, Not Likely to Adversely Affect	Durham/Orange
Alasmidonta heterodon	Dwarf wedgemussel	E	No	No Effect	Orange
Notropis mekistocholas	Cape Fear shiner	E	No	No Effect	Orange

E – Endangered
Source: US Fish and Wildlife Database: Last Updated 06/27/18

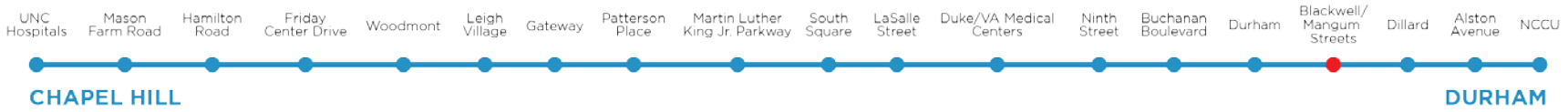
However, North Carolina Natural Heritage Program (NCNHP) records, updated January 2018, do not identify any occurrence of Michaux's sumac within 1.0 mile of the Proposed Refinements study area. GoTriangle conducted a survey for Michaux's sumac and its habitat in June 2018 (i.e., during the optimum survey window of May through October) in the Proposed Refinements study area and found none.

NCNHP records, updated in January 2018, indicate three historical occurrences of smooth coneflower (most recently observed in 1992) within 1.0 mile of the Proposed Refinements study area. However, no suitable habitat for smooth coneflower was identified in NEPA documentation for the Previous Design, and no smooth coneflower individuals were found during a 2013 survey conducted by GoTriangle. GoTriangle conducted a new survey for smooth coneflower and its habitat during the optimal survey window in June 2018 and found no areas of suitable habitat.

Consultation with USFWS for threatened and endangered species occurred in May and June of 2018. See agency correspondence in **appendix L**.

- **Bald Eagle and Golden Eagle Protection:** A review of the NCHNP records indicates no known bald eagle occurrences within one mile of the study area for the Previous Design or the Proposed Refinements.

Migratory Bird Treaty Act: The Migratory Bird Treaty Act of 1918 protects migratory birds, and any part, nest, or egg, from being pursued, hunted, captured, killed, taken into possession, offered for purchase, transported, shipped, or exported (see also 16 U.S.C. § 703 for complete text of the Act). As described in the NEPA documentation for the Previous Design, a number of observed and expected species located within the study area of the Proposed Refinements fall under the purview of the Migratory Bird Treaty Act of 1918; however, none of the activities associated with the Proposed Refinements would interfere with the Migratory Bird Treaty Act protections. The Proposed Refinements are located in the same area as the Previous Design with respect to migratory bird habitat and pathways. The NEPA documentation for the Previous Design determined migratory birds are not likely to be adversely affected by the proposed project. The Proposed Refinements would not introduce new impacts to migratory birds relative to the Previous Design.



- **Essential Fish Habitat:** The National Marine Fisheries Service (NMFS) identified no Essential Fish Habitat within Durham County or Orange County for the Previous Design or the Proposed Refinements.

3.7.2 Environmental Consequences

The Proposed Refinements, when compared to the Previous Design, would shift specific locations of impact, resulting in a reduction in the amount of impacts in some areas and an increase in impacts in other areas. In total, the area of affected biotic communities would be 57 acres greater with the Proposed Refinements as compared to the Previous Design (see **Table 3-9**).

As summarized in **Table 3-9,** the Proposed Refinements would result in impacts to 20 additional acres of terrestrial habitat. The types of impacts would be similar to the impacts described for the Previous Design for soils, habitat, wildlife, and protected species. No significant adverse impacts on terrestrial wildlife or listed species are anticipated to result from the Proposed Refinements.

The Proposed Refinements would not be expected to result in significant impacts on federal or state-listed threatened or endangered species or their habitats.

In light of the analysis in this Supplemental EA, considering the context and intensity of impacts, and considering all impacts already evaluated and disclosed for natural resources in the previous NEPA documents, FTA does not anticipate there will be any new significant impacts associated with the Proposed Refinements.

Appendix G provides a detailed analysis of natural resources impacts associated with the Proposed Refinements.

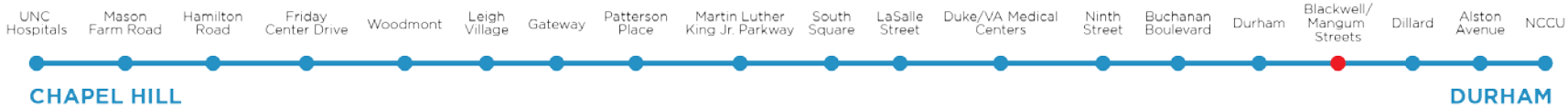
3.7.3 Mitigation Measures

The Proposed Refinements would not result in impacts to natural resources that would require additional mitigation commitments beyond those identified in the Amended ROD.

Table 3-9: Impacts to Biotic Communities in the Study Area

Biotic Community	Previous Design (acres affected)	D-O LRT Project with Proposed Refinements(acres affected)	Change Resulting from the Proposed Refinements (+/- acres affected)
Alluvial	4	6	+2
Bottomland	4	3	-1
Mesic Mixed	88	108	+20
Maintained	238	274	+36
Total	334	391	+57

Source: Proposed Refinements Natural Resources Technical Report.
Note: Rounding was used and may lead to discrepancy in totals.



3.8 Water Resources

This section describes existing conditions of water resources in the areas of the Proposed Refinements that were not documented in the prior NEPA documentation for the Previous Design. This section also describes changes to the potential water resources impacts that would result from the Proposed Refinements as compared with the impacts previously presented, and the measures that GoTriangle would take to avoid, minimize, or mitigate adverse effects to water resources. Additional information is included in **appendix H,** Proposed Refinements Water Resources Technical Report.

3.8.1 Affected Environment

Existing water resources in the Proposed Refinements study area include: groundwater, streams, wetlands, floodplains and floodways, and water quality. No "Navigable Waters" under Section 10 of the Rivers and Harbors Act fall within the study area for the Previous Design or the Proposed Refinements.

Except where described below, existing water resources are expected to be the same for the Proposed Refinements as described for the NEPA documentation for the Previous Design:

- **Stream V:** The study area for the Proposed Refinements includes additional lengths of Stream V that were outside of the Previous Design study area (see **appendix H: Attachment C, Figure 1G**). The extended length of Stream V in the affected environment is 900 linear feet east of George King Road. This length of Stream V is a seasonal Relatively Permanent Water with intermittent flow.
- **Stream N:** The study area for the Proposed Refinements includes additional lengths of Stream N (see **appendix H: Attachment C, Figure1I**). The extended length of Stream N is 30 linear feet upstream west to an access road pipe behind the existing cell tower within the ROMF boundary. This length of Stream N is a seasonal Relatively Permanent Water with intermittent flow.
- **Stream NN:** The study area for the Proposed Refinements includes additional lengths of Stream NN (see **appendix H: Attachment C, Figure 1I**). The extended length of Stream NN is 328 linear feet connecting two previously delineated stream channels and is located within a residential property within the ROMF boundary. This length of Stream NN is a seasonal Relatively Permanent Water with perennial flow.
- **Stream LC:** The study area for the Proposed Refinements includes additional lengths of Stream LC that were outside of the Previous Design study area (see **appendix H: Attachment C, Figure 1U**). The extended length of Stream LC is 150 linear feet located east of US 15-501 (Business Route), beginning at the outfall of the pipe culvert, and continuing east of the project. The extended length of Stream LC is a seasonal Relatively Permanent Water with intermittent flow.

3.8.2 Environmental Consequences

Table 3-10 presents the water resources impacts of the Proposed Refinements as compared with the Previous Design, and shows the amount of increase or decrease in the area of impact.

The change to a single-track bridge would result in fewer pier footings installed within New Hope Creek and Sandy Creek. Construction of the bridge would require less clearing in the New Hope Creek Bottomlands and would avoid the need to relocate the City of Durham's 16-inch waterline in the New Hope Creek Bottomlands. The result would reduce the permanent impacts to streams and riparian buffers.

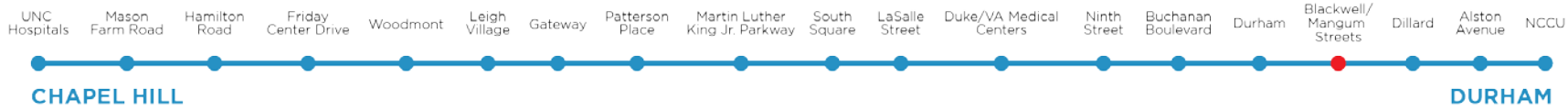


Table 3-10: Summary of Estimated Water Resource Impacts

Water Resource Type	Previous Design (area affected)	Total D-O LRT Project (area affected)	Change Resulting from the Proposed Refinements (+/- area affected)
Streams	3,413 LF (0.44 acre)	4,626 LF (0.60 acre)	+1,213 LF (+0.16 acre)
Wetlands	0.56 acre	0.70 acre	+0.14 acre
Ponds	0.01 acre	<0.01 acre	-0.01 acre
Riparian Buffer Zone 1	4.97 acres	5.91 acres	+0.94 acre
Riparian Buffer Zone 2	4.10 acres	4.42 acres	+0.32 acre
Floodway	0.88 acre	0.60 acre	-0.28 acre
100 Year Floodplain	6.42 acres	3.73 acres	-2.69 acres
500 Year Floodplain	0.38 acre	0.61 acre	+0.23 acre

The Proposed Refinements would result in increases to stream, wetland, riparian buffer, and 500-year floodplain impacts. Impacts to ponds, floodways, and 100-year floodplains would be reduced with the Proposed Refinements. The Proposed Refinements would not create new risks associated with floodplains.

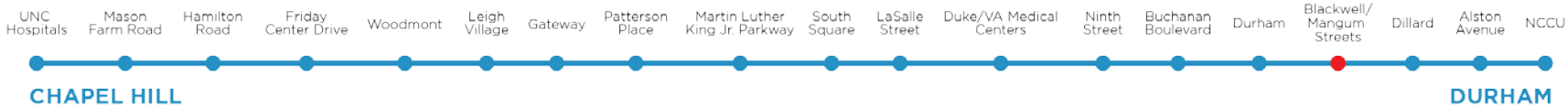
The effects of the Proposed Refinements on groundwater and water quality would be the same as described in the NEPA documentation for the Previous Design.

In light of the analysis in this Supplemental EA, considering the context and intensity of impacts, and considering all impacts already evaluated and disclosed for water resources in the previous NEPA documents, FTA does not anticipate there will be any new significant impacts associated with the Proposed Refinements.

Appendix H, Proposed Refinements Water Resources Technical Report, contains detailed information on water resource impacts.

3.8.3 Mitigation Measures

The Proposed Refinements would not result in impacts to water resources that would require additional mitigation commitments beyond those identified in the Amended ROD are applicable to the Proposed Refinements, including: following avoidance and minimization techniques during final design and construction; following local, state and federal regulations; developing a compensatory mitigation plan with agencies (USACE and the North Carolina Department of Environmental Quality - Division of Water Resources [NCDEQ-DWR]); obtaining necessary permits; reviewing opportunities from green building design and low-impact development; and coordinating water resource commitments with appropriate jurisdictional agencies and including provisions in the construction plans and contract specifications. No new mitigation commitments are needed with the Proposed Refinements.



3.9 Hazardous, Contaminated, and Regulated Materials

This section describes existing conditions with respect to hazardous, contaminated, and regulated materials in the D-O Corridor that were not previously identified in the NEPA documentation for the Previous Design, and potential impacts from the Proposed Refinements on those hazardous, contaminated, and regulated materials sites.

The analysis is based on a Limited Phase I Environmental Site Assessment - Addendum # 1 for the Proposed Refinements (Limited Phase I ESA). The Limited Phase 1 ESA was prepared following the methodology used for the Limited Phase I ESA for the Previous Design. This methodology, in general, conforms to the scope and limitations of the American Society for Testing and Materials (ASTM) Practice E1527-13, with certain exclusions (including site interviews and onsite reconnaissance). ASTM Practice E1527-13 and additional analysis detail is included in **appendix I,** Hazardous, Contaminated, and Regulated Materials Technical Report.

3.9.1 Affected Environment

The Limited Phase I ESA-Addendum #1 examined the entire D-O Corridor and identified 38 sites within the light rail alignment or the 500-foot buffer zone of the entire D-O LRT Project. The data compiled in this Limited Phase I ESA-Addendum #1 updates the previous Limited Phase I ESA for the Previous Design and covers the entire project corridor.

3.9.2 Environmental Consequences

In **appendix I,** the Limited Phase I ESA – Addendum #1, **Table 6-1** and **Figures 6-1 through 6-5** identify the 38 sites that could be affected by the D-O LRT Project with the Proposed Refinements. Four sites are classified as High Risk, 24 sites are classified as Medium Risk, and 10 sites have Indeterminate Risk. **Table 3-11** identifies the four High Risk sites and the recommendation whether these sites require additional testing.

Two of the High Risk sites were identified as Medium Risk sites in the NEPA documentation for the Previous Design; however, the Proposed Refinements warrant changing the findings to High Risk because the light rail alignment is now closer to these sites.

In light of the analysis in this Supplemental EA, considering the context and intensity of impacts, and considering all impacts already evaluated and disclosed for hazardous, contaminated, and regulated materials sites in the previous NEPA documents, FTA does not anticipate there will be any new significant impacts associated with the Proposed Refinements.

3.9.3 Mitigation Measures

Mitigation measures identified in the Amended ROD, including additional assessment and coordination for high and medium risk properties listed in **Table 6-1** and shown **Figures 6-1 through 6-5** of the Limited Phase I ESA (**appendix I**), are adequate and applicable for the reclassified and new sites identified in this section. No additional mitigation measures are recommended.

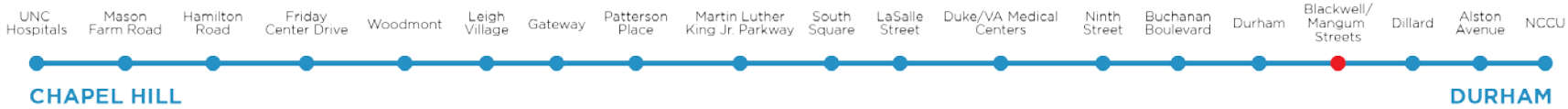


Table 3-11: Limited Phase I ESA Findings – Newly Identified High Risk Sites

Site Name	Address[1]	Regulatory Listing[2]	Data Source[3]	Risk Ranking L/M/H/I[4]	Phase I Recommendation
Duke Medical Center (Bell Building)	Trent Drive	SHWA, SPILLS	D,R	H	Yes
Scarborough & Hargett Funeral	306 South Roxboro Street	SHWS, SPILLS	D,H,R	H	Yes
Glenwood 66	1010 Raleigh Road	UST, LUST	D,R,H	H*	Yes
East 54 Development	1310 Raleigh Road	UST, LUST	D,R	H*	Yes

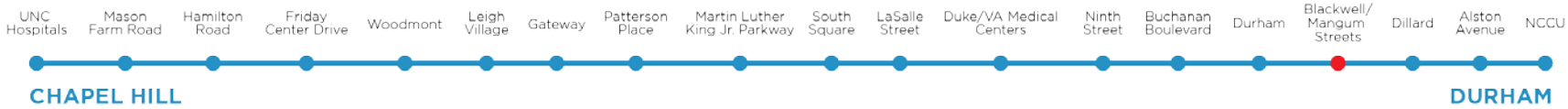
Notes:
1) Corresponds to location of site as indicated in the 2018 EDR report (Limited Phase I ESA).
2) SHWA=Inactive Hazardous Sites Inventory State Hazardous Waste Sites, SPILLS=Spills Incident Listing, UST=Underground Storage Tank, LUST=Leaking Underground Storage Tank
3) Indicates primary information sources for listing: R=Reconnaissance, D=Database, H=Historical Source (historical aerial photographs).
4) Risk of potential impacts onsite: L = Low; M = Medium; H =High; I=Indeterminate (there are no Low Risk sites).
* Identifies previously ranked Medium Risk sites that were elevated to High Risk based on increased proximity with alignment changes.

3.10 Noise and Vibration

This section describes the noise and vibration impacts anticipated from the D-O LRT Project with the Proposed Refinements. The analysis of noise and vibration impacts updates the evaluation for the entire project because:

- Ongoing efforts to advance the engineering of the project may result in changes to noise impacts, including changes in the horizontal and vertical alignment, shifts in station locations, and changes in the speed profile.
- GoTriangle committed in the Amended ROD to study noise at at-grade crossings as design progressed and grade crossing warning requirements were better defined.
- Per the Amended ROD, Mitigation Commitment #NV01, GoTriangle conducted a detailed vibration assessment in accordance with FTA Guidance Manual to further evaluate geotechnical conditions and precisely predict the vibration effects of the proposed light rail system on area receptors.

The noise and vibration impact assessment and mitigation development were performed in accordance with the guidelines specified in FTA's Transit Noise and Vibration Impact Assessment guidance manual (FTA 2006), the same method used in the NEPA documentation for the Previous Design. **Appendix J**, Noise and Vibration Technical Report, provides a detailed description of the noise and vibration analysis, which is summarized here.



3.10.1 Affected Environment

Existing noise levels were measured at 26 sites near the proposed project during December 2017. Measurement sites were selected to represent a range of existing noise conditions and noise sensitive locations throughout the corridor. In **appendix J**, **Figures 4-1 through 4-3** illustrate the general location of the 26 noise monitoring sites. Long-term (24-hour) noise measurements were used to characterize the existing noise at residential locations, and short-term (1-hour) noise measurements were used to characterize the existing noise at non-residential locations and to estimate the noise levels at additional residential locations. The existing noise conditions ranged from 48 to 70 Ldn. Ldn is defined in **appendix J** in section 2.1.

Existing vibration sources along the project alignments include auto, bus, and truck traffic on local streets; however, vibration from street traffic is not perceptible unless streets have large bumps, potholes, or other uneven surfaces. The only major sources of existing ground vibration in the study area are freight train movements and daily Amtrak trains over limited sections of the corridor.

The FTA's vibration impact criteria are not ambient-based; that is, future project vibrations are not compared with existing vibrations to assess impact. Therefore, the vibration measurements for the project focused on characterizing the soil conditions along the proposed alignment rather than on characterizing the existing vibration levels. Vibration propagation measurements were conducted at 10 sites in the study area during December 2017 to determine the vibration response characteristics of the ground near vibration-sensitive locations. The locations of the sites are shown in **appendix J**, **Figures 4-5 through 4-7.**

3.10.2 Environmental Consequences

The results of the noise and vibration impact assessment of the entire project including the Proposed Refinements are presented in this section. In accordance with FTA guidance, noise impact from transit operations was assessed by comparing the project noise with the existing noise conditions. Details can be found in **appendix J**.

In light of the analysis in this Supplemental EA, considering the context and intensity of impacts, and considering all impacts already evaluated and disclosed for noise in the previous NEPA documents and noise mitigation measures that will be developed, FTA does not anticipate there will be any new significant impacts associated with the Proposed Refinements.

3.10.2.1 Noise

LRT Operations

The noise assessment results for LRT operations are presented in **Table 3-12 and Figures 3-12 through 3-18**. **Table 3-12** presents the noise impact results for residential receptors with both daytime and nighttime sensitivity to noise. Noise impacts are related to the sounding of LRT bells as the trains approach at-grade crossings along the corridor and locations where residences are located close to the proposed tracks. The project would result in moderate noise impacts at 24 residential buildings and one institutional building. Because many of the residential buildings that would experience moderate noise impacts are multi-family buildings, the total number of moderate noise impacts, 476, accounts for the estimated number of residential units in the multi-family buildings.

The project would result in severe noise impacts at two multi-family residential buildings representing 34 units. The severe noise impacts are attributed to the special track required for the proposed single-track alignment refinement between SW Durham Drive and Snow Crest Trail.

Table 3-12 presents the noise impact results for institutional receptors with daytime and evening use.

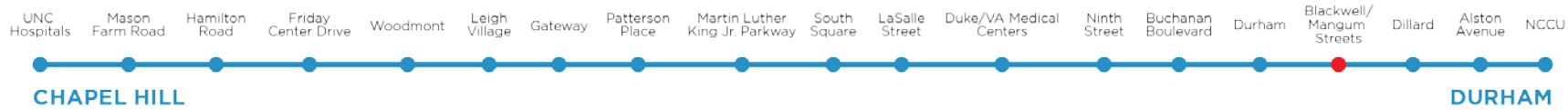
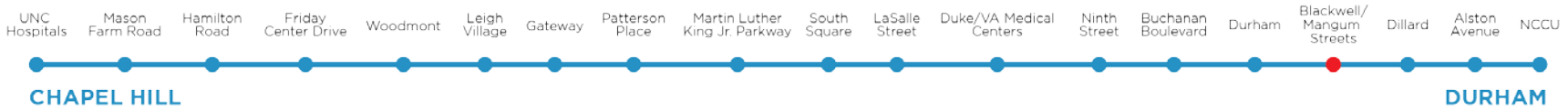


Table 3-12: Summary of Noise Impacts without Mitigation

Location	Type of Receptor	Magnitude and Number of Impacts[1]	
		Moderate	Severe
UNC Campus to Manning Drive - eastbound (see Figure 3-12)	Multi-family residential	25 (1)	0
UNC Campus to Manning Drive – westbound (see Figure 3-12)	Multi-family residential	64 (1)	0
George King Road to Crescent Drive- eastbound (see Figure 3-13)	Single family residential	9 (9)	0
George King Road to Crescent Drive- westbound (see Figure 3-13)	Single family residential	1 (1)	0
Interstate 40 to Garrett Road – eastbound (see Figure 3-15)	Multi-family residential	24 (2)	18 (1)
Garrett Road to Durham-Chapel Hill Boulevard – eastbound (see Figure 3-15)	Multi-family residential	60 (3)	16 (1)
Garrett Road to Durham-Chapel Hill Boulevard – westbound (see Figure 3-15)	Multi-family residential	138 (3)	0
Durham-Chapel Hill Boulevard to Cameron Boulevard – eastbound (see Figure 3-16)	Multi-family residential	90 (3)	0
Cameron Boulevard to Swift Avenue – westbound (see Figure 3-17)	Multi-family residential	64 (1)	0
Swift Avenue to Fayetteville Street (see Figure 3-18)	Duke – Center for Documentary Studies	1 (1)	0
Total		476 (25)	34 (2)
ROMF			
Culp Hill Drive to Ephesus Church Road (see Figure 3-14)	Single family residential	12 (12)	0
Ephesus Church Road to I-40 (see Figure 3-14)	Single family residential	1 (1)	0
Total		13 (13)	0

Source: Cross-Spectrum Acoustics, 2018

[1] The numbers are reported by number of units affected. The numbers provided in parenthesis represent the number of total buildings by impact. The number of units for multi-family buildings was estimated using aerial photography, property and land use records.



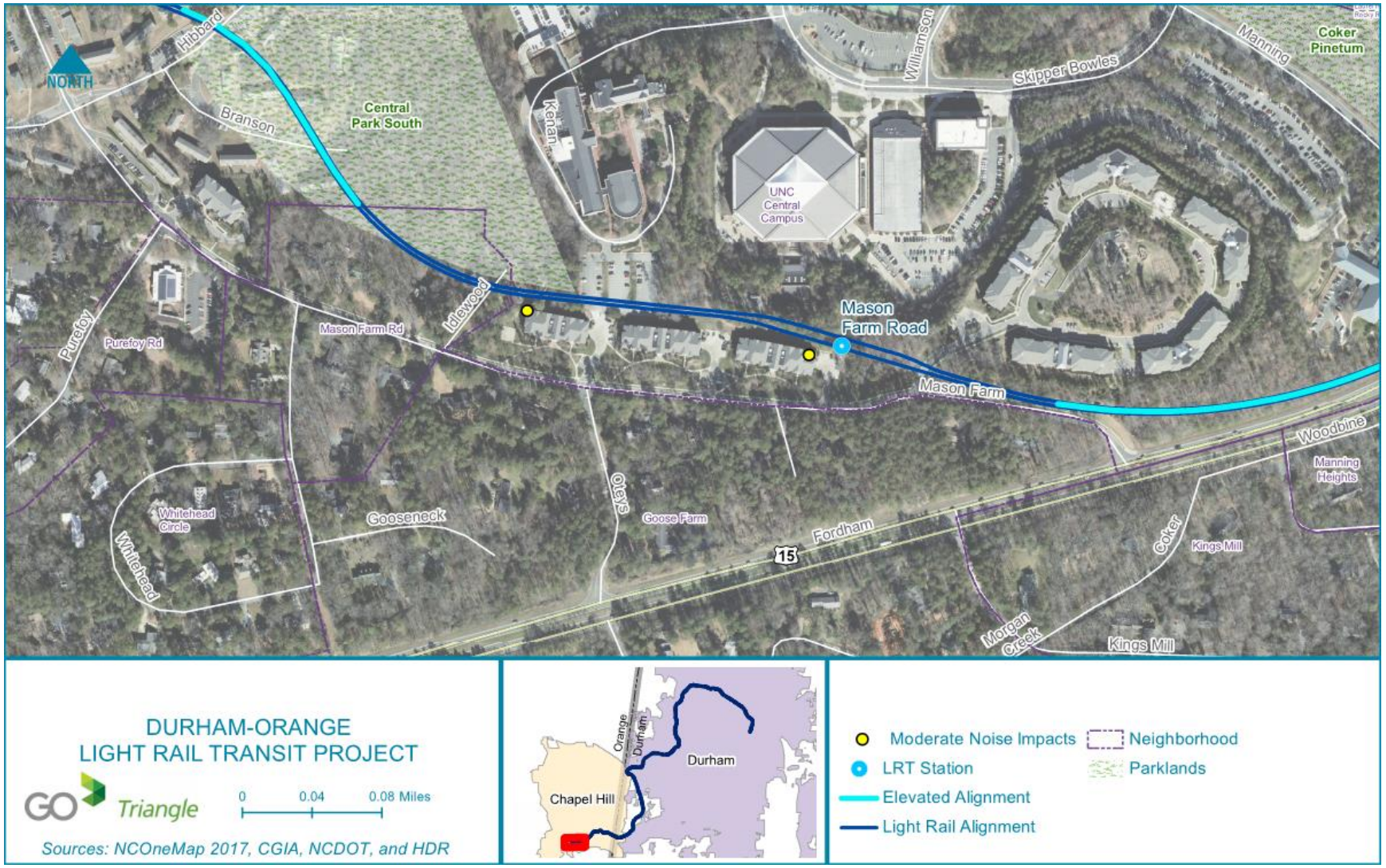
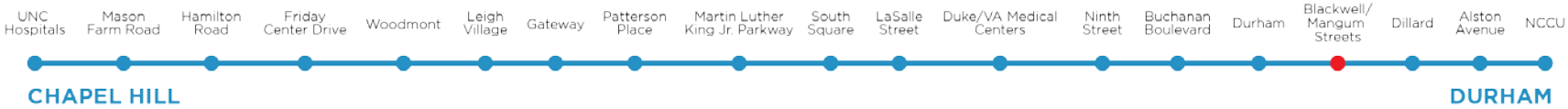


Figure 3-12: Noise Impacts (1 of 7)



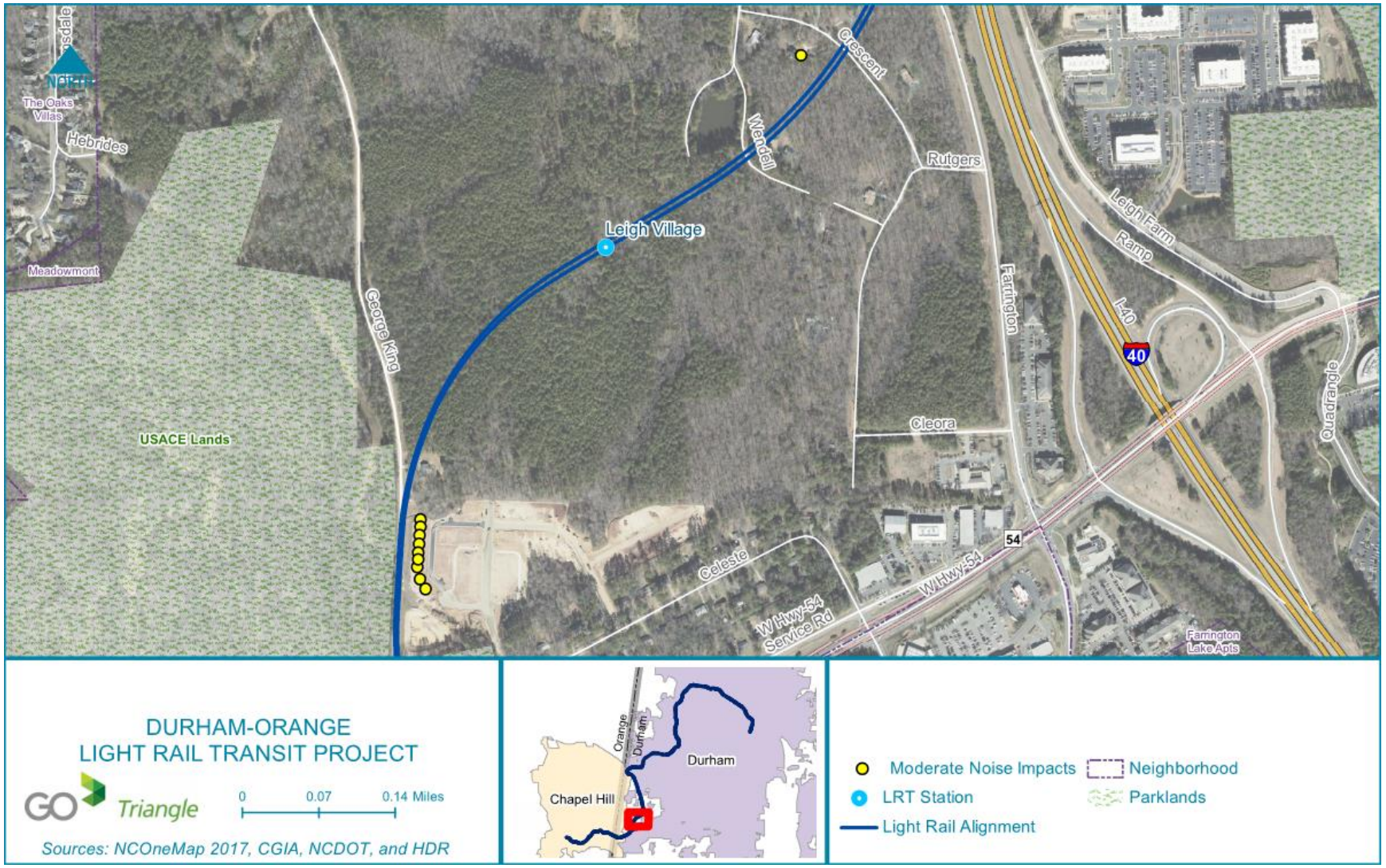
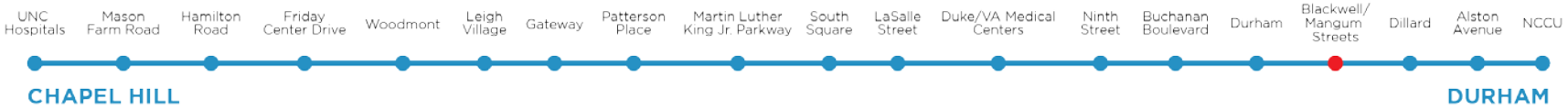


Figure 3-13: Noise Impacts (2 of 7)

Figure 3-14: Noise Impacts (3 of 7)



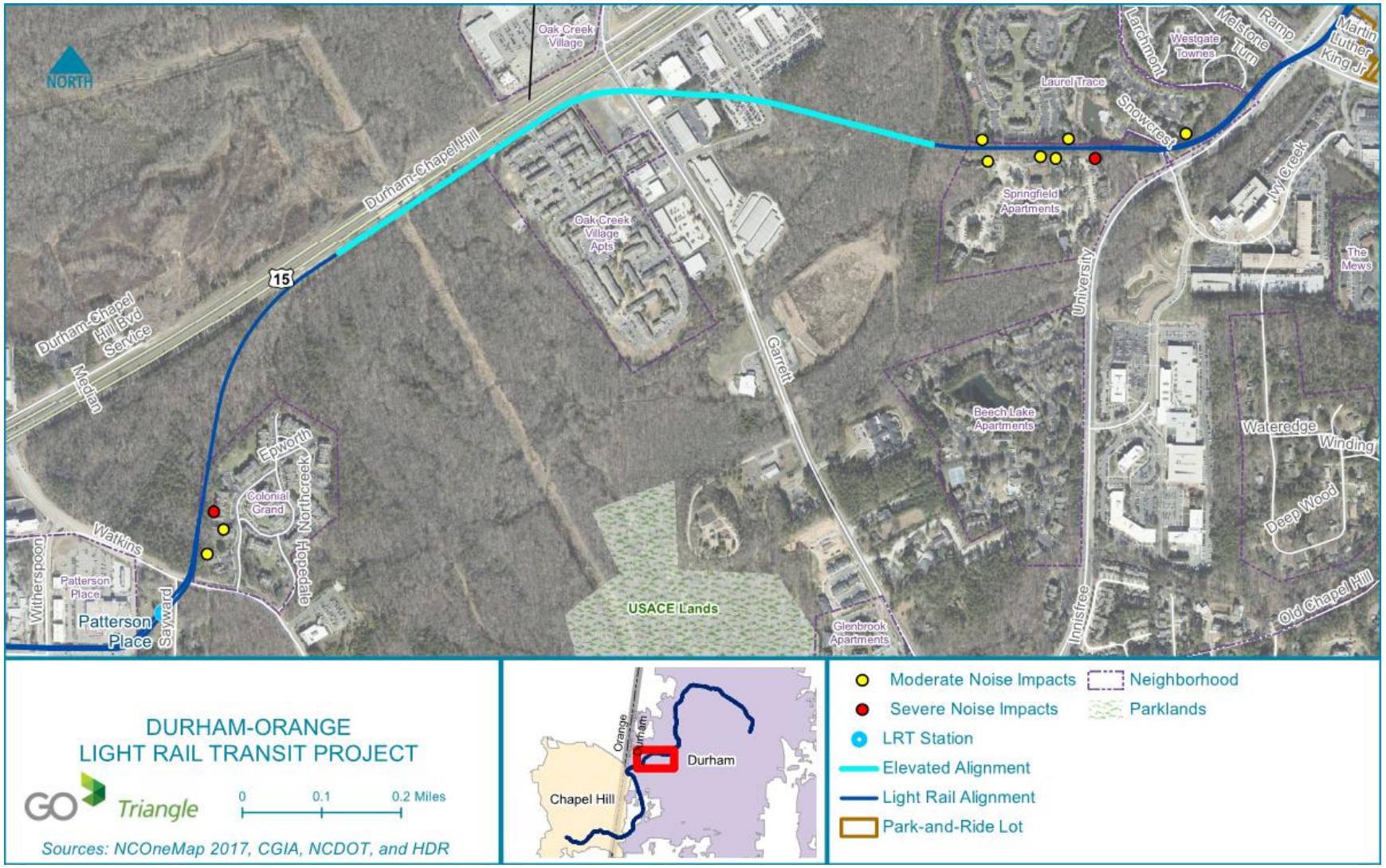
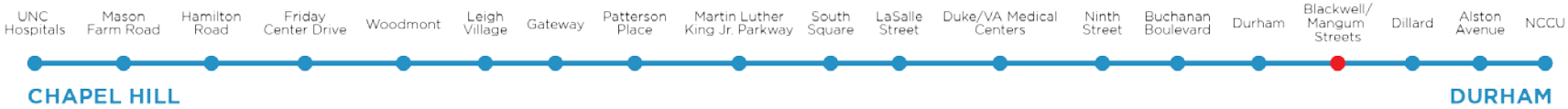


Figure 3-15: Noise Impacts (4 of 7)



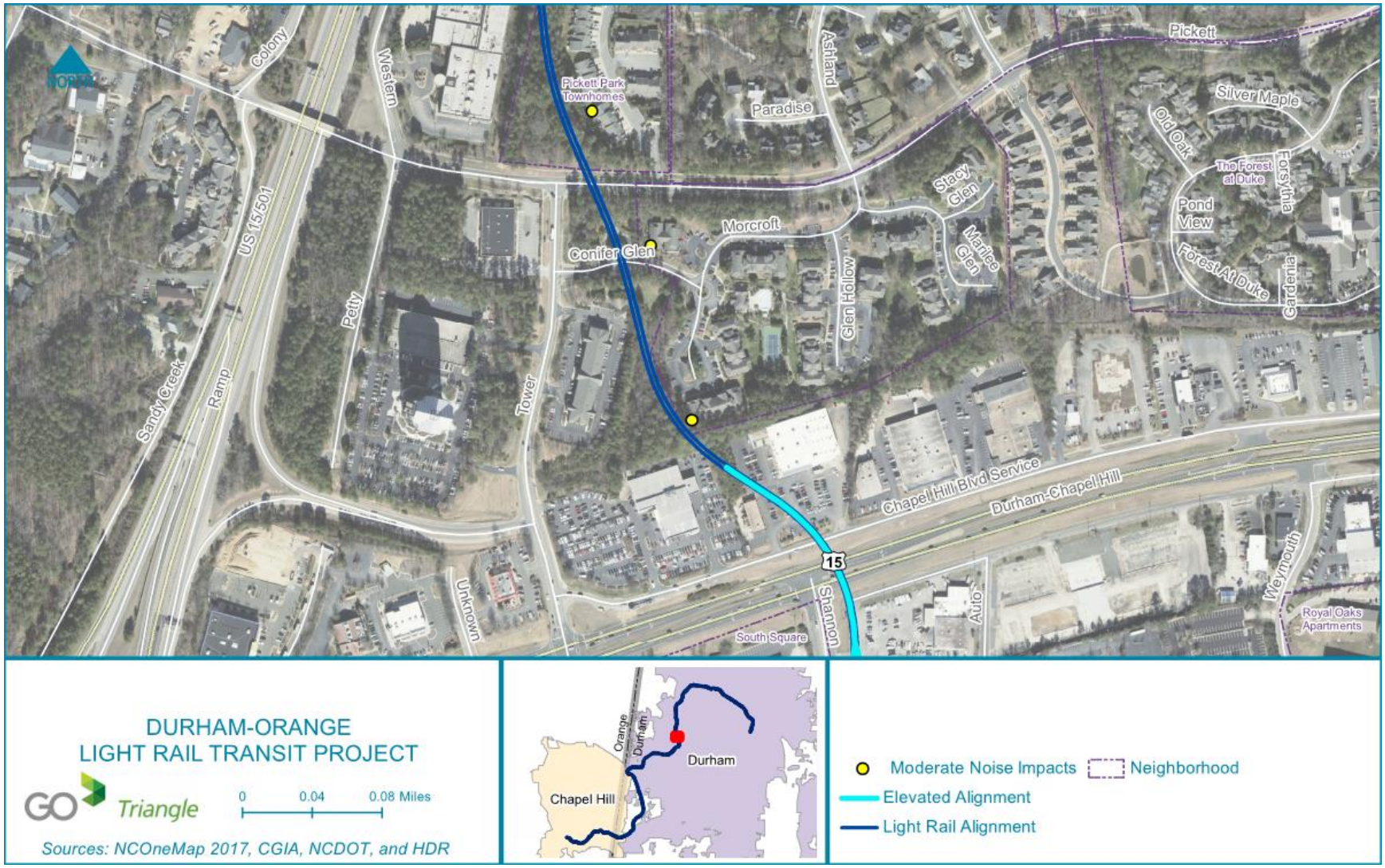
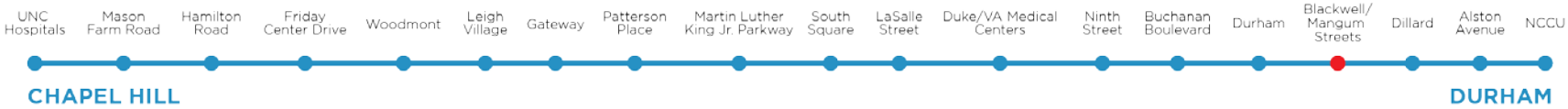


Figure 3-16: Noise Impacts (5 of 7)



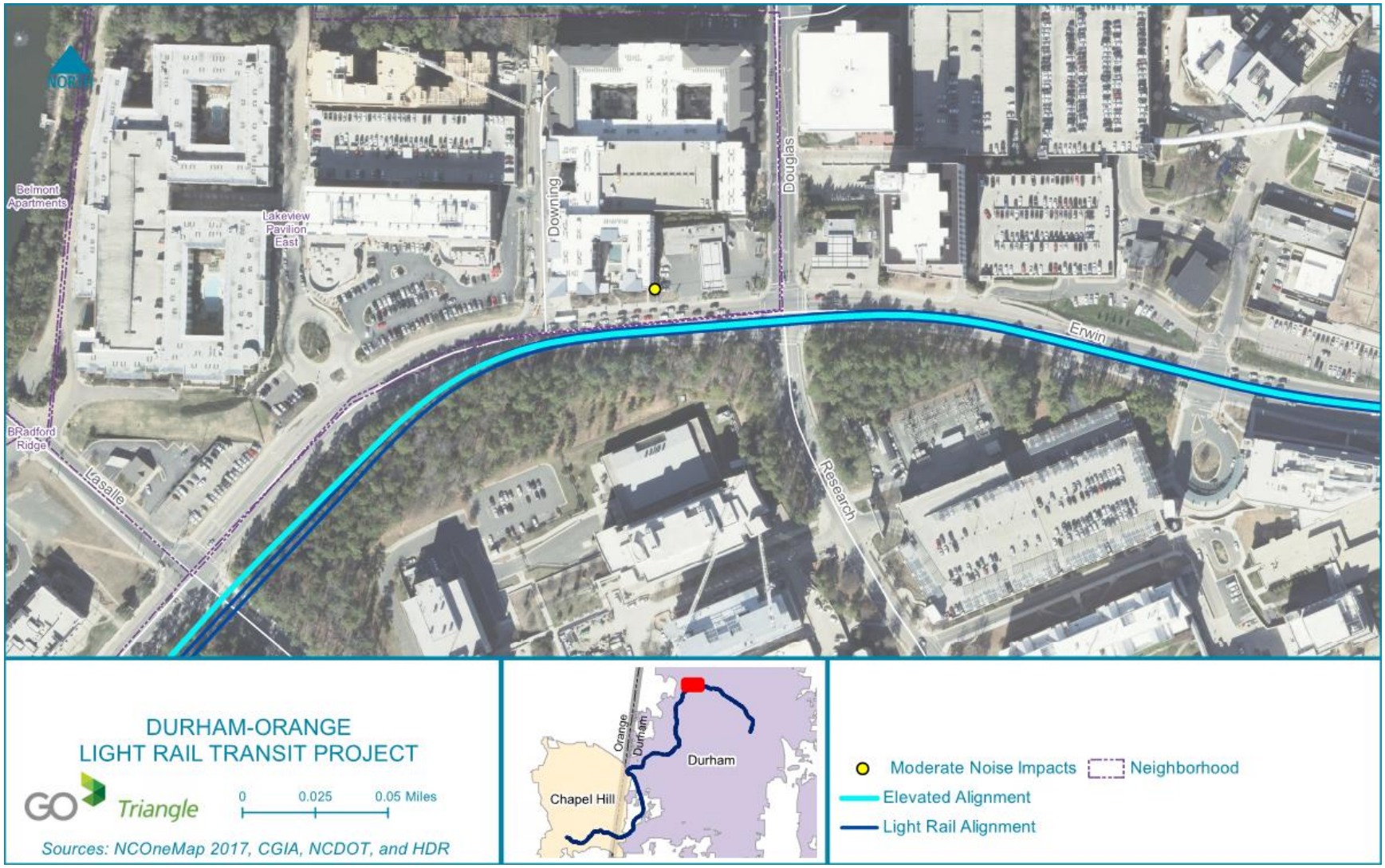


Figure 3-17: Noise Impacts (6 of 7)

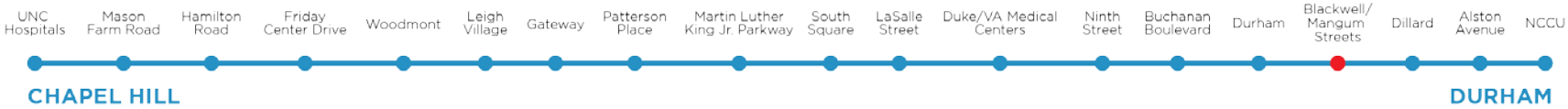
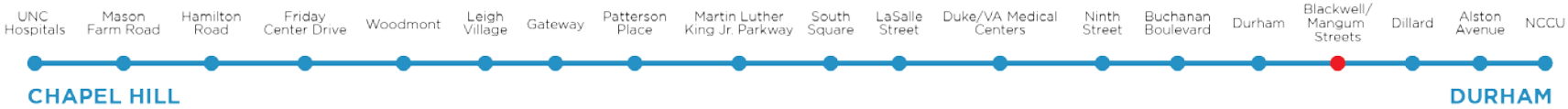


Figure 3-18: Noise Impacts (7 of 7)



ROMF

The noise assessment results for the ROMF also are presented in **Table 3-12**. The ROMF would result in moderate noise impacts at 13 residences. Due to the removal of trees to accommodate the ROMF improvements, noise from I-40 would increase resulting in increased noise impacts.

3.10.2.2 Vibration

The results of the vibration assessment indicate that the project will result in no vibration impacts. Details of this vibration assessment are included in **appendix J**.

3.10.3 Mitigation Measures

3.10.3.1 Noise

The FTA guidance states that severe noise impacts should be mitigated unless there are no feasible or practical means to do so (FTA 2006). For moderate impacts, discretion should be used, and project-specific factors should be included in the consideration of mitigation. The project-specific factors can include:

- The existing noise levels and the projected increase in noise levels;
- The types and number of noise-sensitive land uses with impacts;
- Existing sound insulation of buildings; and
- The cost-effectiveness of providing noise mitigation.

GoTriangle will develop a noise mitigation policy to address mitigation for transit noise impacts, including those at the moderate level, based on FTA's guidance on mitigation. Once this policy is enacted, specific mitigation measures, such as installation of sound barriers, earth berms, sound insulation, or other measures, will be determined at locations that qualify for mitigation.

3.10.3.2 Vibration

Because no vibration impacts have been identified, no vibration mitigation is required for the D-O LRT Project.

3.11 Safety and Security

This section describes the potential safety and security impacts anticipated with the Proposed Refinements and how impacts differ from those evaluated in the NEPA documentation of the Previous Design.

3.11.1 Affected Environment

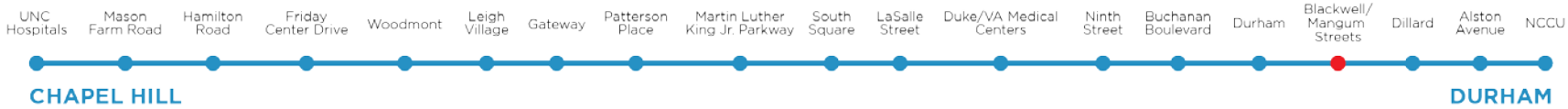
The NEPA documentation for the Previous Design describes the safety and security plans, policies, and procedures for safe and secure transit operations that have applicability to the Proposed Refinements.

3.11.2 Environmental Consequences

The impacts of the Proposed Refinements to safety and security are discussed in this section in comparison to the Previous Design.

Like the Previous Design, the Proposed Refinements would be designed and operated in accordance with GoTriangle's safety and security plans. The types of potential impacts to passenger safety; transit vehicles; employees and contractors; and police, security, and emergency service operations would be the same as described in the NEPA documentation for the Previous Design. The Proposed Refinements would affect safety and security for pedestrians, bicyclists, and motorists. Those impacts are described as follows.

In light of the analysis in this Supplemental EA, considering the context and intensity of impacts, and considering all impacts already evaluated and disclosed for safety and security in the previous NEPA documents, FTA does not anticipate there will be any new significant impacts associated with the Proposed Refinements.



3.11.2.1 Station Platforms, Park-and-Ride Facilities, Track Alignment

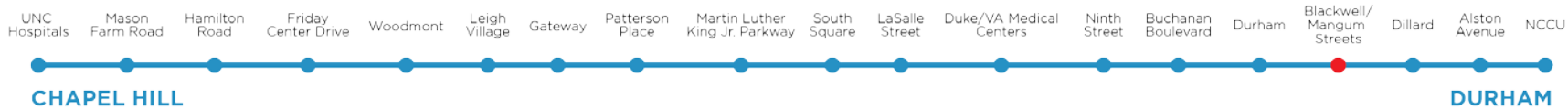
Proposed Refinements include changes to all station platforms, reducing the size to accommodate two-car trains, rather than the three-car trains of the Previous Design. Park-and-ride lots changed at the Friday Center Drive, Gateway, Martin Luther King Jr. Parkway, South Square, Dillard and Alston Avenue stations. Provisions for safe pedestrian and bicycle crossing remain part of project design; therefore, the Proposed Refinements would not change the overall impact to safety and security at the station platforms and park-and-ride facilities described in the NEPA documentation for the Previous Design.

Where the alignment has been revised from a double-track to a single-track, between Patterson Place Station and Martin Luther King Jr. Parkway Station, control points with signals would be implemented for safe operations of the light rail. All train signals and control systems will be developed in accordance with standard rail industry practices.

3.11.2.2 Pedestrians, Bicyclists, and Motorists

The Proposed Refinements include the addition of sidewalks and multi-use paths to improve the safety of pedestrians and bicyclists. The location and number of at-grade crossings of the light rail track would change at some locations, which would change the number and location of potential pedestrian/vehicle conflicts. These potential impacts are described as follows.

- **UNC Hospitals Station**: Change from pedestrian bridge to Dogwood Parking Deck (Previous Design) to on-street crosswalks would be a new point of potential conflict between pedestrians and motorists.
- **Mason Farm Road Station:** Improved pedestrian and bicycle access to station and to Dean E. Smith Center would improve bicycle and pedestrian safety.
- **Gateway Station:** Additional at-grade road crossing south of the relocated station would add a new point of potential conflict for motorists crossing the track. The roundabout design change would provide a safer and more efficient design that protects both the traffic and pedestrian flow through the railroad gates and allows the protection gates to stop all movement and fully protect the light rail vehicle.
- **Martin Luther King Jr. Parkway Station and vicinity:** Change from center-running alignment (Previous Design) to side-running, signalizing intersections at Larchmont Road and BB&T Plaza Drive, and modification to the sidewalks, bicycle lanes, and multi-use paths would improve safety.
- **South Square Station:** Change from at-grade crossing at University Drive/Shannon Road intersection (Previous Design) to an underpass (Proposed Refinements) would reduce vehicle/pedestrian/light rail vehicle conflict at the intersection. The change from an elevated (Previous Design) to an at-grade light rail alignment crossing at Auto Drive would add a new point of potential conflict for pedestrians and motorists crossing the track. Improved bicycle and pedestrian access to the platform would improve safety.
- **Water Main Relocation along US 15-501:** The Proposed Refinements include relocation of a 3,500-foot section of existing underground water main to the opposite side of US 15-501, placing it in proximity to the Duke Lemur Center, which would require additional security fencing along the Duke Lemur Center property. GoTriangle will provide security fencing and add security gates on either end of the utility



easement, where there is a roadway crossing, to allow for maintenance of the relocated utility line in proximity to the Duke Lemur Center.

- **Realignment along Western Bypass and Erwin Road:** Track crossing of Western Bypass (Previous Design) would be removed, and three driveway crossings would be added, which would improve safety; however, the overall potential for conflicts between motorists and light rail would not change. The change from a center-running track (Previous Design) to side-running along Erwin Road would reduce pedestrian/vehicle conflicts and improve pedestrian safety.
- **Duke/VA Medical Centers:** The change from at-grade center-running (Previous Design) to elevated structure would eliminate the potential conflict of ambulances and other vehicles crossing the tracks in this area The elevated structure would provide direct access to the platform from the sidewalks.
- **Ninth Street Station:** Improved sidewalk connections would improve the safety of pedestrian and bicycle access to the station.
- **Blackwell/Mangum Streets Station and vicinity:** The addition of the multi-use path on the east side of Blackwell Street from Pettigrew Street to Vivian Street would provide safer access for pedestrians and bicyclists to the station. A fence would be added to prevent pedestrians from crossing between the proposed LRT tracks and the NCRR tracks, and the Blackwell Street crossing would be closed to all traffic. A signature civic space approximately mid-block between Blackwell and Mangum streets would provide access between Pettigrew and Ramseur Street over Pettigrew Street, the light rail tracks, the NCRR tracks, and Ramseur Street.
- **Dillard Street Station:** Changes to roadway, platform location, and pedestrian facilities would provide safer conditions for motorists, pedestrians, and bicyclists relative to the previous design.
- **Alston Avenue Station:** Improved pedestrian access to station and changes to the existing path between the R. Kelly Bryant Bridge and Alston Avenue just north of NC 147 would improve the safety and security of station access.

3.11.3 Mitigation Measures

GoTriangle will coordinate with Duke University to locate security fencing along the Duke Lemur Center property and provide security gates for utility maintenance. Outside of fencing changes, the Proposed Refinements would not result in other safety and security impacts that would require additional mitigation commitments beyond those identified in the Amended ROD.

3.12 Energy

This section quantifies the net expenditure of energy associated with the construction, maintenance, and operation of the Proposed Refinements.

3.12.1 Affected Environment

Information on the existing energy environment, including energy providers in the D-O LRT Project area, can be found in the NEPA documentation for the Previous Design. The Proposed Refinements do not include any additional energy providers or energy consumption characteristics.

3.12.2 Environmental Consequences

Direct energy used for transportation in the Triangle region is dependent upon the vehicle miles traveled by automobile, buses, and light rail vehicles. The Proposed Refinements do not include major changes in alignment length,

station location, train frequency, or bus operations relative to the Previous Design. Given the nature of the Proposed Refinements, there would not be a substantial change in vehicle miles traveled, and therefore it is expected that the annual energy usage would be similar to the usage disclosed in the NEPA documentation for the Previous Design.

3.12.3 Mitigation Measures

The Proposed Refinements would result in similar energy savings as documented in the NEPA documentation for the Previous Design. No mitigation would be warranted.

3.13 Acquisitions, Relocations, and Displacements

This section describes the potential property acquisitions, relocations, and displacements for the Proposed Refinements and how impacts differ from those evaluated in the NEPA documentation of the Previous Design.

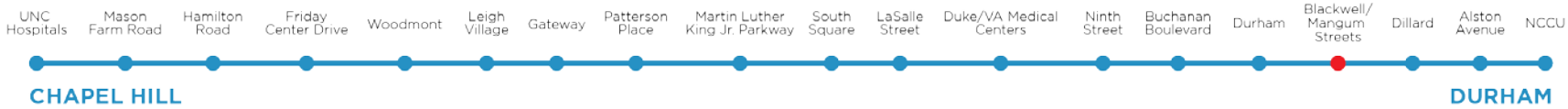
3.13.1 Affected Environment

Existing land uses, including those within the Proposed Refinements study area, are described in section 0 (Land Use and Zoning).

3.13.2 Environmental Consequences

The additional full acquisition displacements that would result from the Proposed Refinements are described as follows:

- Two residential properties would be acquired on Cleora Drive and Wendell Road as a result of the changes to the right-of-way for the local roadway network. These roadway changes would improve light rail alignments and intersections while preserving the future development potential in the area.
- The shift in location of Gateway Station and the corresponding track alignment would result in the acquisition of two additional residential properties on White Oak Drive, and one additional residential property at the intersection of White Oak Drive and Old Chapel Hill Road.
- The shift in location of Patterson Place Station would result in one additional residential acquisition on Southwest Durham Drive and two additional residential displacements on Sayward Drive.
- A design refinement along the elevated section between Patterson Place Station and Martin Luther King Jr. Parkway Station would result in the acquisition of two additional commercial properties on Garrett Road, a tile store and a warehouse.
- The shift in location of the alignment and the station at Martin Luther King Jr. Parkway Station would result in the acquisition of one multi-family residential building and the acquisition of a commercial building and bank. A reconfiguration of the layout of the parking lot at MLK Jr. Parkway Station would require the acquisition of a second bank and a vacant NCDOT parcel.
- The alignment shift and expansion of parking at South Square Station would require the acquisition of two fast food restaurants and a mattress store.
- Between Buchanan Boulevard and Durham Stations, a commercial building identified for acquisition in the previous NEPA documentation was recently converted to institutional use (Indigo Montessori School). This property acquisition would still be required under the Proposed Refinements; as such, a new community resource in this area would be relocated.
- The additional roadway and parking around the Alston Avenue Station to



improve pedestrian and vehicular movements would require the acquisition of one vacant property on Gann Street and a commercial property (gas station) on Alston Avenue. It would also require the acquisition of three additional residential properties along Gillette Avenue, two residential properties on Colfax Street, and one residential property on Grant Street.

- Based on new design information and the advancement in roadway design, additional rights-of-way would be required along the intersections with Alston Avenue. These changes would result in one residential acquisition on Linwood Avenue and one residential acquisition on Dupree Street.

Table 3-13 includes a summary of full and partial acquisitions as a result of the Proposed Refinements.

In light of the analysis in this Supplemental EA, considering the context and intensity of impacts, and considering all impacts already evaluated and disclosed for acquisitions, relocations, and displacement in the previous NEPA documents, FTA does not anticipate there will be any new significant impacts associated with the Proposed Refinements.

3.13.3 Mitigation Measures

The Proposed Refinements would have additional acquisition impacts relative to the Previous Design. The mitigation commitments identified in the Amended ROD would be applicable and appropriate to address the acquisition impacts of the Proposed Refinements and no new mitigations commitments would be required.

3.14 Utility Impacts

This section describes the existing utilities and potential impacts anticipated with the Proposed Refinements and how impacts differ from those evaluated in the NEPA documentation of the Previous Design.

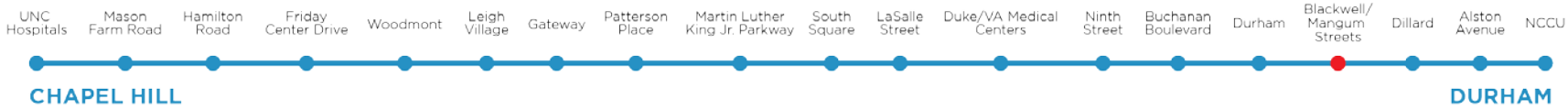
3.14.1 Affected Environment

Utilities in the vicinity of the Proposed Refinements include water and sewer, gas, electric power, telecommunications, cable television, and traffic signals; these are consistent with the utilities identified within the Previous Design study area.

Through consultation with utilities, additional information was obtained; relocation requirements were identified for the Proposed Refinements.

Table 3-13: Acquisitions, Relocations, and Displacements

Acquisition or Relocation/ Displacement	Total Impacts of Previous Design	New Impacts of Proposed Refinements	Total Impacts of D-O LRT Project
Full Acquisitions	126	+27	153
Partial Acquisitions	142	+72	214
Relocations/Displacements	88	+26	114



3.14.2 Environmental Consequences

The Proposed Refinements modification from a double-track to a single-track section along the bridge over the New Hope Creek Bottomlands Forest would avoid the relocation of the City of Durham's 16-inch water line.

The proposed shift in the Martin Luther King Jr. Parkway Station location would avoid the Frontier Communications facility and duct bank system along University Drive. Relocation of this utility system would not be required with incorporation of the Proposed Refinements.

The Proposed Refinements along Erwin Road would avoid impacts to, or the relocation of, the underground 44 kV high-voltage electric transmission line serving Duke University and the Duke University Medical Center. With incorporation of the Proposed Refinements, the 44 kV line will be unaffected by the D-O LRT project; thereby avoiding potential electrical service disruption at the hospitals, as well as the expense of relocating a major high voltage electrical transmission line.

To minimize impact to the Duke University Golf Club, the Proposed Refinements include relocation of a 3,500-foot section of existing underground water main to the opposite side of US 15-501. Relocation of the water line in proximity to the Duke Lemur Center would require additional security fencing along the Duke Lemur Center property. Section 3.11.2 describes the security impacts associated with this design change.

At the proposed Blackwell/ Mangum Streets Station, new utility services, including power, water, and sewer services, would be required to service the station.

In light of the analysis in this Supplemental EA, considering the context and intensity of impacts, and considering all impacts already evaluated and disclosed for utilities in the previous NEPA documents, FTA does not anticipate there will be any new significant impacts associated with the Proposed Refinements.

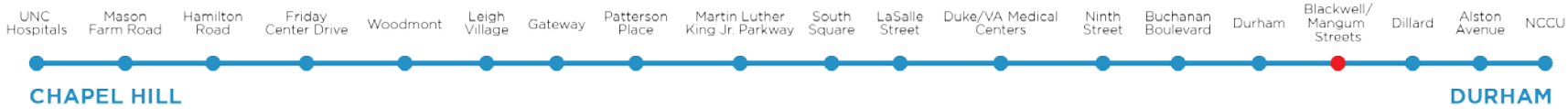
3.14.3 Mitigation Measures

The Proposed Refinements would not result in utility impacts that would require additional mitigation commitments beyond those identified in the Amended ROD. GoTriangle will coordinate with Duke to locate security fencing along Duke Lemur Center property and provide security gates for utility maintenance.

3.15 Construction

Detailed descriptions of the potential construction impacts of the D-O LRT Project on a range of resource areas (e.g., transportation, businesses, neighborhoods) are included in previous NEPA documentation. This section describes construction impacts of the Proposed Refinements relative to the Previous Design, identifying resources for which impacts of the Proposed Refinements would be different from the impacts previously documented in the Combined FEIS/ROD. This section also describes locations where additional detail describing construction methods has been developed during design advancement.

In light of the analysis in this Supplemental EA, considering the context and intensity of impacts, and considering all construction impacts already disclosed in the previous NEPA documents, FTA does not anticipate there will be any new significant construction impacts associated with the Proposed Refinements.



3.15.1 Construction Scenarios and Construction Consequences

Overall, the construction of the Proposed Refinements would utilize similar construction techniques described in the prior NEPA documentation. These techniques would be used for the construction of stations, park-and-ride facilities, elevated light rail infrastructure, light rail alignment on retained fill, and at-grade light rail alignment in a dedicated alignment, or a dedicated alignment within an existing roadway.

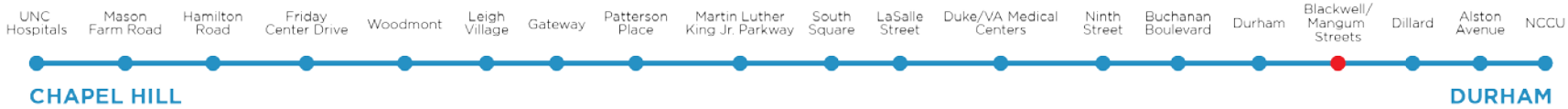
Consequences of construction of the Proposed Refinements would be similar in type and magnitude as the Previous Design, except as described. Where the Proposed Refinements expand the construction area (e.g., new sidewalks that were not included in the Previous Design, and a new light rail station), the area experiencing effects during construction would be expanded. Changes to the project area are described in detail in chapter 2 of this Supplemental EA.

As the engineering of the Project has advanced, the project design has developed to where new components, such as elevated or underpass structures, are now included in the Proposed Refinements. Design parameters such as pile spacing, utility constraints, floodplain impacts, soil conditions, locations of bedrock, and sensitive natural resources have influenced the construction types and methods. Ongoing resource and impact minimization efforts are balanced with schedule implications, costs, and constructability. In limited sections of the Project, new or modified construction techniques would be employed for the Proposed Refinements, including:

- **Farrington Road Bridge Underpass:** An underpass is proposed at the Farrington Road Bridge crossing, instead of the bridge modification included in the Previous Design. Cut-and-cover excavation methods are assumed.
- **New Hope Creek Bridge:** To minimize and mitigate wetland and natural resource impacts, minimum ground disturbing construction techniques will be utilized to limit construction impacts in the vicinity of New Hope Creek and Sandy Creek. A temporary construction easement may be utilized to construct the single-track bridges. The easement areas will be restored to pre-construction conditions.
- **ROMF Rock Cut:** A portion of the ROMF requires rock excavation and potential drill and blast techniques.
- **Shannon Road/University Drive Underpass:** An underpass is now proposed to avoid the at-grade intersection crossing of Shannon Road and University Drive. Cut-and-cover excavation methods are assumed.
- **Al Buehler Trail:** Elevated infrastructure for the light rail alignment is proposed over Al Buehler Trail requiring temporary closure of the trail during construction.
- **Erwin Road Elevated Structure:** Elevated infrastructure for the light rail alignment and two stations through the Duke University area is proposed instead of an at-grade alignment in the median of Erwin Road.

3.15.1.1 Farrington Road Bridge Underpass

At the Farrington Road Bridge crossing of I-40, an independent light rail underpass would be constructed below the western approach of the existing bridge to allow for a future bridge widening and to avoid further modifications to the end of the existing bridge as assumed in the Previous



Design. The Proposed Refinements assume a pre-cast concrete arch structure design for the light rail alignment. The proposed structure would be located as close as possible to the existing roadway bridge, while still preserving the integrity of the existing roadway bridge structure. Partial demolition of the wingwall of the existing roadway bridge would be required to accommodate the underpass. Conventional trenching and cut-and-cover excavation methods would be used with temporary shoring, sheet piling, soil nail walls, and other support structures in place during excavation and construction. Limited rock excavation would also be performed by hoe ram, jack hammer, or other conventional methods.

To accelerate the construction schedule, a temporary closure of Farrington Road near the underpass would likely be required, involving a traffic detour using Ephesus Church Road, Pope Road, and Old Chapel Hill Road. Traffic detours would be scheduled to minimize impacts to local schools.

3.15.1.2 New Hope Creek Bridge

In the vicinity of US 15-501 and New Hope Creek, the proposed bridge construction type has been further modified across the three sections; the west third crossing New Hope Creek, the middle third over the Garrett Road commercial and residential properties, and the east third over Sandy Creek. For the segments over New Hope Creek and Sandy Creek, minimum ground disturbing construction techniques would be used to reduce disturbance to wetlands and floodplains. Minimum ground disturbing construction techniques may include the use of temporary work platforms to construct the bridge. The temporary construction easement that would be needed to construct the bridges would be limited to a 25-foot width beyond the permanent easement on one side of the alignment. The areas utilized for the temporary work platform will be restored to pre-construction conditions.

At the middle third of the structure, approximately from the east boundary of the New Hope Creek floodplain to the west boundary of the Sandy Creek floodplain, conventional “ground up” construction methods would be used involving pile driving or drilling shafts, cranes, loaders, and concrete trucks, including:

- Spans up to 140 feet;
- Precast pre-stressed concrete beams;
- Cast-in-place concrete deck supporting direct-fixation track
- Hammerhead or two-column bents;
- Drilled pier foundations; and
- Ground access for construction equipment and vehicles.

3.15.1.3 ROMF Rock Cut

At the ROMF, limited areas would require rock excavation to ease construction of the proposed rail yard infrastructure. Rock excavation would be performed by conventional mining methods, which may include standard mechanized or non-mechanized mining methods such as excavation by air driven hammer, hand excavation and drill and blast methods. Drill and blast methods refer to an excavation technique consisting of drilling holes into rock in predetermined patterns, loading them with small, targeted explosives, and using sequentially delayed detonation of those explosives to excavate the rock in a controlled manner referred to as sequential excavation. This type of blasting also controls the fragmentation of the rock and reduces the duration of noise and ground-borne vibration impacts.

A number of engineering monitoring, engineering controls, and mitigation measures would be employed to reduce noise and vibration levels for these areas of rock excavation. Structures and buildings within the vicinity of the

potential vibration zone of influence would receive pre-construction surveys and post-construction surveys to confirm no changes occurred during construction. Residents in the vicinity would be provided with advance notification of the timing of the rock excavation activities. Prior to excavation, to further mitigate noise and vibration, other measures would be employed, such as using smaller charges for blasting and using the soil covering the bedrock and blast mats. During the excavation, vibration and seismic monitoring would also be performed to monitor and ensure acceptable vibration levels are maintained.

3.15.1.4 Shannon Road/University Drive Underpass

A cut-and-cover excavation method is proposed for the construction of an underpass section of the track alignment below the Shannon Road and University Drive intersection. The underpass alignment would eliminate a long grade crossing through a wide and busy intersection, taking advantage of the existing topography, and would allow South Square Station to be at grade instead of elevated.

Cut-and-cover is a construction method for shallow underpasses, where a trench is excavated from above and the sides are supported. Temporary supports for cut-and-cover construction consist of vertical walls such as steel soldier piles with timber lagging, sheet piles, drilled shafts or slurry walls. Depending on the depth of the excavation and the ground conditions, the vertical walls may need to be internally braced with struts that span horizontally across the excavation or are supported with tieback anchors. Utilities, including a water main, would be relocated in advance of construction, as required, to remove any obstructions prior to excavation and to maintain utility service.

Once excavated, the final structure is constructed within the trench, the remaining space is backfilled, and the surface is restored, as temporary supports are sequentially removed or left in place. The conceptual structure type proposed for the underpass is a two-cell, cast in place concrete box culvert (see **Figure 2-10**). Construction would require a full excavation to the bottom of the concrete box culvert in order to allow placing the concrete slabs and walls of the box. During construction of cut-and-cover underpasses, street crossings and adjacent areas may be decked to allow vehicular traffic and use of properties to be maintained above the cut.

A portion of the underpass would be constructed within bedrock, requiring rock excavation. For these areas, the project would employ Conventional Mining Methods using the engineering controls and mitigation described above in the ROMF Rock Cut description.

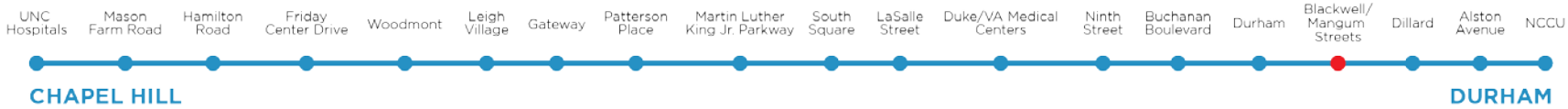
3.15.1.5 Elevated Structure over Al Buehler Trail

As described in section 3.6.2, the design changes to the elevated track over Al Buehler Trail included in the Proposed Refinements would require relocation of the Al Buehler Trail. Portions of the trail would be temporarily closed during construction.

3.15.1.6 Erwin Road Elevated Structure

As described in section 2.2, the light rail alignment and two stations along Erwin Road would no longer be at grade within the median of Erwin Road, and would instead be constructed on an elevated structure from west of LaSalle Street to the crossing of NC 147. The elevated light rail alignment would shift from the south side of Erwin Road to the median at Downing Street until Anderson Street, where it would move to the north side of Erwin Road, cross over Anderson Street and Durham Freeway/Highway 147. Major elements that have been incorporated into the design are:

- Maintain a 15-foot horizontal clearance envelope from the underground Duke Energy



transmission line located beneath and along Erwin Road to the light rail construction.

- Minimize impacts to the Duke Energy overhead electric line located on the north side of Erwin Road.
- Minimize impacts to the VA Medical Center property.
- Eliminate emergency vehicle interaction with light rail operations in the vicinity of the medical centers.

Prior to construction, private utilities affected by the Proposed Refinements would be relocated in coordination with the utility providers. Water and sewer relocations would be coordinated with the City of Durham in the early stages of construction.

The elevated structure would be largely constructed as described in DEIS section 4.16.1.1, Light Rail Elevated on Structure, using conventional "ground up" construction methods involving pile driving or drilling shafts, cranes, loaders, and concrete trucks. Spans between the piers would involve precast concrete segmental box girders installed with an overhead gantry using a combination of span-by-span (from pier to pier), or balanced cantilever (where the span is built out in each direction from a pier to balance the weight) techniques. Benefits of this approach include:

- Overhead construction using a gantry is an efficient construction method for transit alignment.
- Traffic impacts to Erwin Road are minimized by using overhead erection of the superstructure.
- Gantries for segmental construction would be more cost effective than ones used to erect traditional concrete and steel plate girders.

3.15.1.7 Downtown Durham

As with the Previous Design, it is anticipated that construction will result in temporary changes in access and mobility; roadway connections may be temporarily affected and bus routes will need to be re-routed to adjacent roads. Changes to the roadway system and impacts to roadways during construction would alter the bus routes and the access to the Durham Bus Station. In particular, parts of Pettigrew Street between W. Chapel Hill Street and Grant Street will be closed to all users as the street is re-graded and LRT tracks and stations are constructed. Construction of the proposed signature civic space across Pettigrew Street, the light rail tracks, the NCRR tracks, and Ramseur Street would also require the temporary closure of part or all of Ramseur Street for up to one block.

Construction of the light rail alignment along Pettigrew Street would temporarily affect a 0.12-mile segment of the Downtown Durham Trail between W. Main Street and Vivian Street.

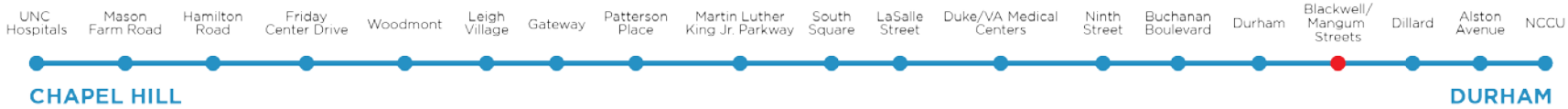
The connectivity of the trail would be maintained during construction by providing a signed detour route.

3.15.2 Mitigation Measures

The mitigation commitments included in the Amended ROD to address construction impacts would remain applicable to the Proposed Refinements. During construction, bus traffic will need to be re-routed to adjacent roadways to allow for continued access to local bus stops. GoTriangle will continue to work with local transit agencies to ensure continued access to bus routes during construction.

Additional mitigation measures for construction impacts of the Proposed Refinement include:

- **Water Resources:** Use of horizontal directional drilling to avoid and minimize impacts to regulated wetlands and waters.
- **Vibration:** Structures and buildings within the vicinity of the potential vibration zone of influence would be surveyed pre- and post-construction



to confirm no changes occurred during construction.

- **Noise:** Once the GoTriangle noise mitigation policy is enacted, specific mitigation measures for light rail operations will be determined, such as limiting loud construction activities to daytime hours, use of temporary noise barriers and implementing construction techniques to reduce noise.
- **Recreation:** GoTriangle will coordinate with Duke University to notify users of the Al Buehler Trail of any temporary closures during construction. In Downtown Durham, GoTriangle will coordinate with the City to provide signage for a temporary detour of the Downtown Durham Trail.

3.16 Indirect and Cumulative Effects

The following section describes the potential indirect and cumulative impacts associated with the Proposed Refinements and how impacts differ from those evaluated in the NEPA documentation of the Previous Design.

3.16.1 Indirect Impacts

3.16.1.1 Affected Environment

Indirect impacts are reasonably foreseeable effects that occur later in time or further in distance from an action. Elements of the Proposed Refinements that were not evaluated in NEPA documentation for the Previous Design and that have the potential to result in new indirect impacts are:

- Proposed Blackwell/Mangum Streets Station;
- Site preparation for potential future development at Gateway, South Square, and Alston Avenue stations, and at the parcel bounded by North Carolina Railroad, Duke Street, and Chapel Hill Street in Durham known as the Triangle parcel; and
- Changes at Patterson Place Station that would better situate the station for potential future development, relative to the Previous Design.

3.16.1.2 Environmental Consequences

Potential indirect impacts associated with the Proposed Refinements were evaluated for the following resources:

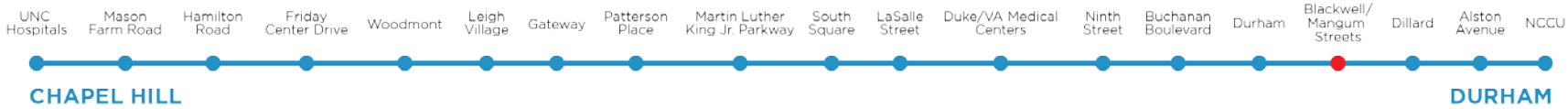
- Land use; and
- Acquisitions, relocations, and displacements.

This analysis of indirect effects addresses the area within ½ mile of the proposed Blackwell/Mangum Streets Station and other station locations with potential indirect effects and a horizon year of 2040.

In light of the analysis in this Supplemental EA, and considering the indirect impacts already evaluated and disclosed in the previous NEPA documents, FTA does not anticipate there will be any new significant indirect impacts associated with the Proposed Refinements.

Land Use

The amended Durham Comprehensive Plan (https://durhamnc.gov/346/Comprehensive-Plan) is designed to encourage TOD and encourage high-density, mixed-use, walkable development. The Downtown Durham Master Plan was also updated and focuses on the need for increased transportation alternatives and TOD. The indirect impacts on land use within ½ mile of the proposed Blackwell/Mangum Streets Station; Gateway, Patterson Place, Martin Luther King Jr. Parkway, South Square, and Alston Avenue stations; and at the Triangle parcel would result from induced development in these station areas. The induced



development would be consistent with the Durham Comprehensive Plan and Downtown Durham Master Plan because of the proximity and access to transit. Additionally, some indirect effect on land use could occur through increased residential density, but development would need to be consistent with the corresponding Design District land use categories, according to Durham future land use plans. Impacts at specific locations are described as follows:

Proposed Blackwell/Mangum Streets Station

This station was included in the Proposed Refinements to meet the project goal of providing direct service to key destinations in downtown Durham and was developed in response to public comments received. Land use within ½ mile of the proposed station location is urban, including major transportation corridors (NC 147 and the NCRR rail corridor), and commercial, industrial, institutional, and high density land uses. Induced growth consistent with the Durham Comprehensive Plan and Downtown Durham Master Plan could occur within ½ mile of the station.

Gateway Station

Based on local government and public input, and the TOD planning grant, the alignment and station location of the Gateway Station was shifted to the west. This change in the alignment expands the overall economic development opportunity at Gateway Station and increases the acreage within the Orange County portion of Chapel Hill that is within ½ mile of the station platform.

The grant-funded TOD study, which evaluates the maximum potential development that could result from successful TOD planning, indicates that the shift associated with the Proposed Refinements would increase the potential developable area within ¼ mile of the Gateway station by 26 acres. The TOD study also indicates that with the shift, there is the potential for an additional 2.9 million square feet of development projected within ¼ mile walk-distance of the station with the shift.

While there are no current development plans at this time, due to the proximity to I-40 and the strong market demand in Chapel Hill, it is likely that development in this area would still occur without light rail. However, the presence of light rail and TOD planning efforts for the Gateway Station area maximize the potential development that could occur within the station area, as transit supportive development would occur in a more dense fashion and would occur earlier than traditional development without the market forces associated with light rail.

GoTriangle refined the design at Gateway Station to include acquisition and site preparation for a park-and-ride facility that may also support future development (redevelopment). Future development would be subject to local land use regulations.

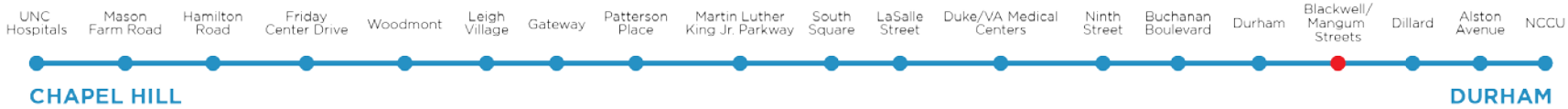
Patterson Place Station

The Patterson Place Station was moved to increase accessibility and visibility to support future development in the station area and reduce the number of uneconomic remnant land. These changes are consistent with the land use plans and zoning for the Compact Neighborhood and compact design district.

The area immediately surrounding the Patterson Place station is currently designated as a Compact Neighborhood. These designations will guide development around this area to those areas that are approved for high-density, residential and mixed-use development and will not infringe on protected Natural Heritage Area of the New Hope Creek Bottomlands Forest.

Martin Luther King Jr. Parkway Station

The proposed changes at Martin Luther King Jr. Parkway Station would move the station from the center of University Drive to the south side of University Drive. This would avoid the need to



widen University Drive and improve pedestrian and bicycle access across University Drive relative to the Previous Design. The design change would better support future compact, walkable development in the station area.

South Square Station

Similar to Gateway Station, the design refinements at South Square Station include acquisition and site preparation for park-and-ride facilities that may also support a future development (redevelopment). Future development would be subject to local land use regulations.

The Triangle Parcel

GoTriangle has owned this parcel since 2004. The Previous Design, which remains unchanged, included hazardous material remediation as part of site preparation for the light rail alignment, which could also support future development on the site. Future development would be subject to local land use regulations.

Alston Avenue Station

The design refinements at Alston Avenue Station include acquisition and site preparation for a park-and-ride facilities that may also support a future development (redevelopment). Future development would be subject to local land use regulations.

Additional detail on impacts related to induced growth is included in section 3.2.

Acquisitions, Relocations and Displacements

Induced growth associated with the Proposed Refinements could result in indirect impacts to property owners, as well as residents and business owners, as a result of acquisitions, relocations, and displacements to accommodate the new development.

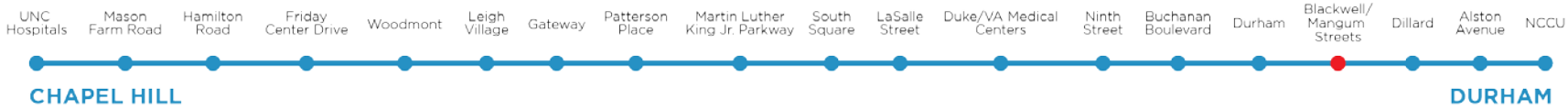
Gentrification and reduction in affordable housing is a potential effect of the induced growth from the addition of the proposed Blackwell/Mangum Streets Station and the Proposed Refinements at Gateway, Patterson Place, Martin Luther King Jr. Parkway, South Square, and Alston Avenue stations. GoTriangle has engaged in extensive public involvement regarding this issue and studied affordable housing strategies as part of FTA's TOD Planning Pilot Program Grant. GoTriangle also collaborated with the Town of Chapel Hill, the City of Durham, and Durham County on their strategies to preserve existing affordable housing and produce new affordable housing units near light rail stations. GoTriangle also works with local groups engaged in the issue, including the Coalition for Affordable Housing and Transit, a local advocacy group that is deeply involved in the topic.

Amended ROD Mitigation Commitment #EJ01 included opportunities for local businesses to benefit from commercial space within the parking deck at the Alston Avenue Station. The Proposed Refinements change the design from a parking deck to surface lots, eliminating this opportunity for commercial space.

As noted in the NEPA documentation for the Previous Design, land use changes anticipated as an indirect consequence of the D-O LRT Project would occur in accordance with local planning and development requirements and local zoning codes, and would support the vision for the area as identified in local plans. Acquisitions, relocations, and displacements that could result as an indirect consequence of the D-O LRT Project with the Proposed Refinements are not anticipated to materially affect the availability of residential and commercial properties. Additional detail on acquisitions and relocations is included in section 3.13.

3.16.1.3 Mitigation Measures

The Proposed Refinements would not result in indirect effects that would require additional mitigation commitments beyond those included in the Amended ROD.



3.16.2 Cumulative Impacts

Cumulative impacts result from the incremental impact of an action when added to past, present, and reasonably foreseeable future actions. Cumulative impacts associated with the D-O LRT Project are discussed in detail in the NEPA documentation for the Previous Design. GoTriangle reviewed the Proposed Refinements in the context of past, present, and reasonably foreseeable future actions to identify new cumulative impacts.

3.16.2.1 Affected Environment

The past, present and reasonable foreseeable future actions contributing to cumulative impacts with the D-O LRT Project have not changed from the NEPA documentation for the Previous Design, with the exception of a new additional reasonably foreseeable future transportation project in the D-O Corridor.

The 2045 MTP identifies a western extension of Danziger Drive from its terminus at Mount Moriah Road in Patterson Place across I-40 and connecting to the proposed Gateway Station roadway network. In the MTP, the Danziger Drive extension is forecast to occur in the 2026-2035 timeframe, either near the end of D-O LRT construction or after the D-O LRT Project has been constructed.

3.16.2.2 Environmental Consequences

The Proposed Refinements would not contribute to cumulative impacts beyond those presented in the NEPA documentation for the Previous Design. The Danziger Drive extension has been identified in the area's long range transportation plans as one of several connections between the areas of land bisected by US 15-501 and I-40, including the Gateway and Patterson Place station areas. Construction of the Danziger Drive extension could have construction impacts on top of the impacts caused by construction of the D-O LRT Project. GoTriangle will coordinate with the appropriate transportation agency regarding the timing of construction.

The Danziger Drive extension is expected to improve connectivity between the Gateway and Patterson Place station areas, which would encourage economic development at those stations. This increased development would be in accordance with the Town of Chapel Hill's and City of Durham's long-range plans for intensive, walkable TOD in those station areas, and would therefore be considered to be a positive impact. See section 3.2.2 for a discussion of direct impacts to land use in station areas.

In light of the analysis in this Supplemental EA, considering the context and intensity of impacts, and considering the cumulative impacts already evaluated and disclosed in the previous NEPA documents, FTA does not anticipate there will be any new significant cumulative impacts associated with the Proposed Refinements.

3.16.2.3 Mitigation Measures

No new cumulative impacts have been identified in this Supplemental EA that would require new mitigation commitments beyond those included in the Amended ROD.