

Highway 421 Land Use Study

City of Greensboro, NC
MAY 2024



ACKNOWLEDGMENTS

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1 STUDY AREA SNAPSHOT



INTRODUCTION

The Highway 421 Corridor Land Use Study is intended to provide specific guidance for development along the Highway 421 Corridor and the future land use within the area. A detailed assessment of the existing conditions was conducted to identify issues and opportunities in the area. The City of Greensboro received an Economic Adjustment Assistance Grant, administered by the U.S. Economic Development Authority (EDA) to fund a study of the Highway 421 Corridor to support economic development spurred by the Toyota battery plant and better understand how this area could further support economic development activities and be used to create additional jobs.

This chapter provides:

- An assessment of existing conditions including physical framework, land use patterns, transportation infrastructure, utilities and services, and parks and recreation;
- An overview of the regulatory and policy framework including zoning, special districts, and boundaries;
- An analysis of environmental constraints;
- An analysis of proposed economic development sites.

The study area for this planning effort is located within unincorporated Guilford County and Town of Pleasant Garden. Areas may be eligible to be served by City of Greensboro water and wastewater utilities. Where adopted long-range policies present conflicting land use recommendations, staff from the City of Greensboro and Guilford County should work together to address development proposals and to, at minimum, determine appropriateness of proposed use(s), assess surrounding development patterns, review relevant jurisdictional studies and plans impacting the subject area, and address the availability of existing and planned infrastructure.

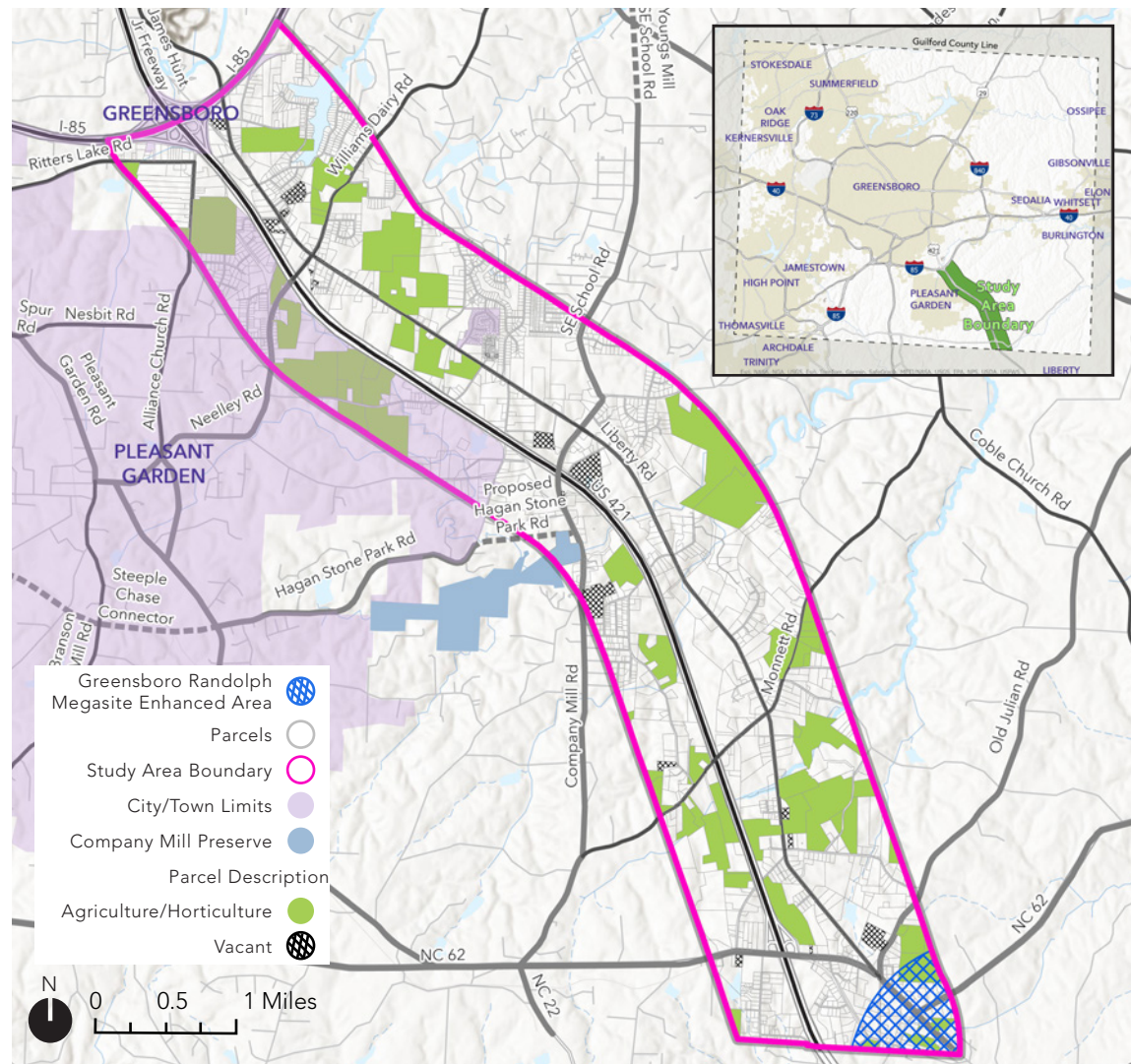
STUDY AREA SELECTION

The study area, shown in Map 1, is focused on the Highway 421 Corridor consistent with the EDA Grant that will support the funding for this project. The study area boundary was selected after considering three boundary options – all emphasizing Highway 421 and Liberty Road corridors as the primary roadway framework for the Study. The study area extends from the intersection of I-85 and Highway 421 to the Guilford/Randolph County line. It reflects an area along the Highway 421 corridor – one-half mile on the west side and one mile on the east side (to include Liberty Road). In addition to the City of Greensboro, it includes parts of the Town of Pleasant Garden, Guilford County, and the Greensboro Randolph Megasite Enhanced Area.

Greensboro Randolph Megasite Enhanced Area

The Megasite is a regional collaboration between government, businesses, and education institutes. The megasite will house Toyota’s first electric car battery plant in North America. To mitigate potential negative impacts, the City of Greensboro has agreed to not extend new water or sewer services within the designated one-mile Enhanced Area surrounding the megasite to new low density residential developments.

Map 1. Study Area



EXISTING CONDITIONS

EXISTING PLANS AND POLICIES

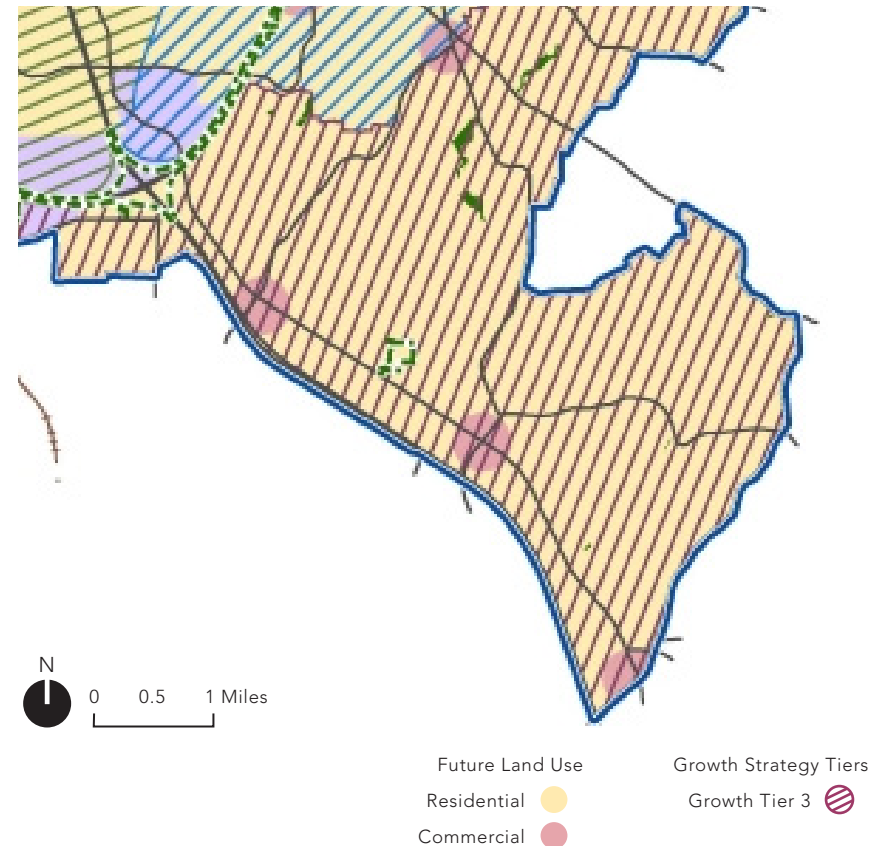
The initial stages of the Study development process included a review of the existing documents and proposed development to understand their impact on the study area. These documents included recent plans and policies adopted by the City of Greensboro and Guilford County. A brief overview of the relevant plans and policies is provided below.

GSO2040 COMPREHENSIVE PLAN

GSO2040, the City of Greensboro’s award-winning Comprehensive Plan, was adopted in June 2020. **GSO2040** is a long-range planning document that sets forth the vision for the City and recommends strategies to achieve the goals for the continued growth and development of the City. Starting with Map 2: **GSO2040** has two Anticipated Growth Maps, a Future Land Use Map and a Future Built Form map which describes how land uses fit together. Map 2 shows an excerpt from the Future Land Use map for the study area. This map designates most of the area as Residential, which may include other uses at an appropriate scale. Areas near key intersections are designated as Commercial. The Future Built Form map designates the area as Exurban, as it is outside the City limits. The Commercial nodes are designated as District Scale Activity Centers.

The Plan identifies Highway 421 Corridor to the Greensboro Randolph Megasite as a major influencer to growth in the area. The development of the Greensboro Randolph Megasite, a 1,500 acres advanced manufacturing site, will hugely impact the Highway 421 corridor. A part of the study area extending from the intersection of Highway 421 and I-85 to the County boundary (excluding the Town of Pleasant Garden) is included in Growth Tier 3 of the Water and Sewer Service Area, meaning that the City may be able to provide water and sewer services in this area under specific, limited circumstances, and with appropriate agreements in place.

Map 2. GSO2040 Comprehensive Plan - Proposed Future Land Use



WATER & SEWER SERVICES POLICY

The *Water and Sewer Services Policy* for the City of Greensboro was adopted in 2012. The City last updated its annexation practices and this policy for extending water and sewer to unincorporated areas in January 2023. This policy is currently in the process of being updated. The City provides water and sewer services within the Water and Sewer Service Area (WSSA). The City is currently able to provide services in Growth Tier 1, while the study area is located in Growth Tier 3.

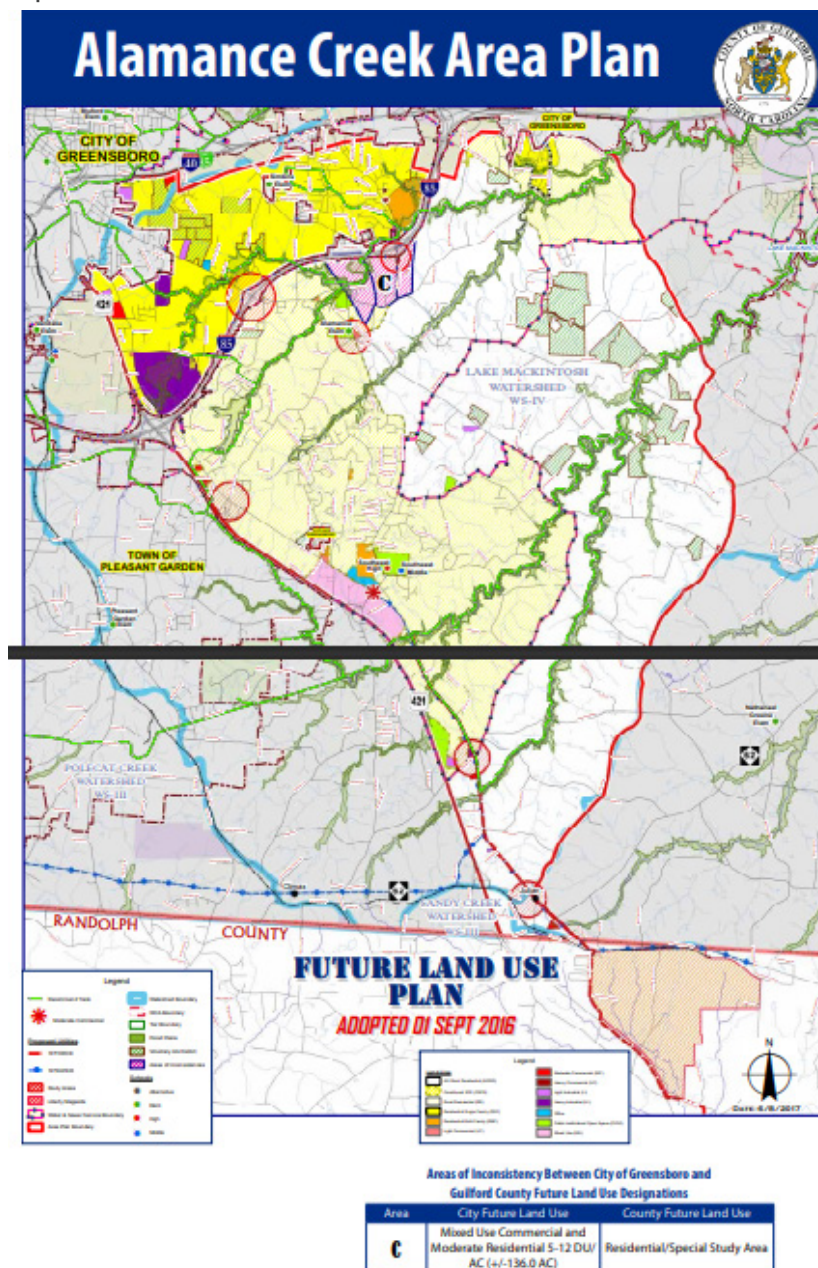
ALAMANCE CREEK AREA PLAN AND SOUTHERN AREA PLAN (2016 UPDATE)

The *Guilford County Alamance Creek Area Plan* and the *Southern Area Plan*, adopted in 2016, build on the previously adopted land use and transportation plans to present the future land use plan for the study area. The plans propose trail connections per the Greensboro Urban Area Metropolitan Planning Organization (MPO) *2015 Bicycle, Pedestrian, and Greenway Master Plan*. The future land use plan from the *Alamance Creek Area Plan* and *Southern Area Plan* will inform the development scenarios for this Highway 421 Corridor Study, with the following recommendations being most impactful:

- The plans identify key areas at major intersections along Liberty Road, as shown in Map 3. These areas are anticipated to experience significant growth due to recent improvements to transportation and utilities, as well as site characteristics. Non-residential land uses likely are suitable in these areas. These key areas warrant special consideration in future plan updates to assess infrastructure progression and development patterns, and to provide an opportunity for public comment before detailed recommendations.
- Moderate Commercial is also identified at the intersection of Liberty Road and SE School Road.

The Guilford County Planning and Development Department is currently updating the County's Comprehensive Plan. The project team will continue to coordinate with the County.

Map 3. Alamance Creek Area Plan



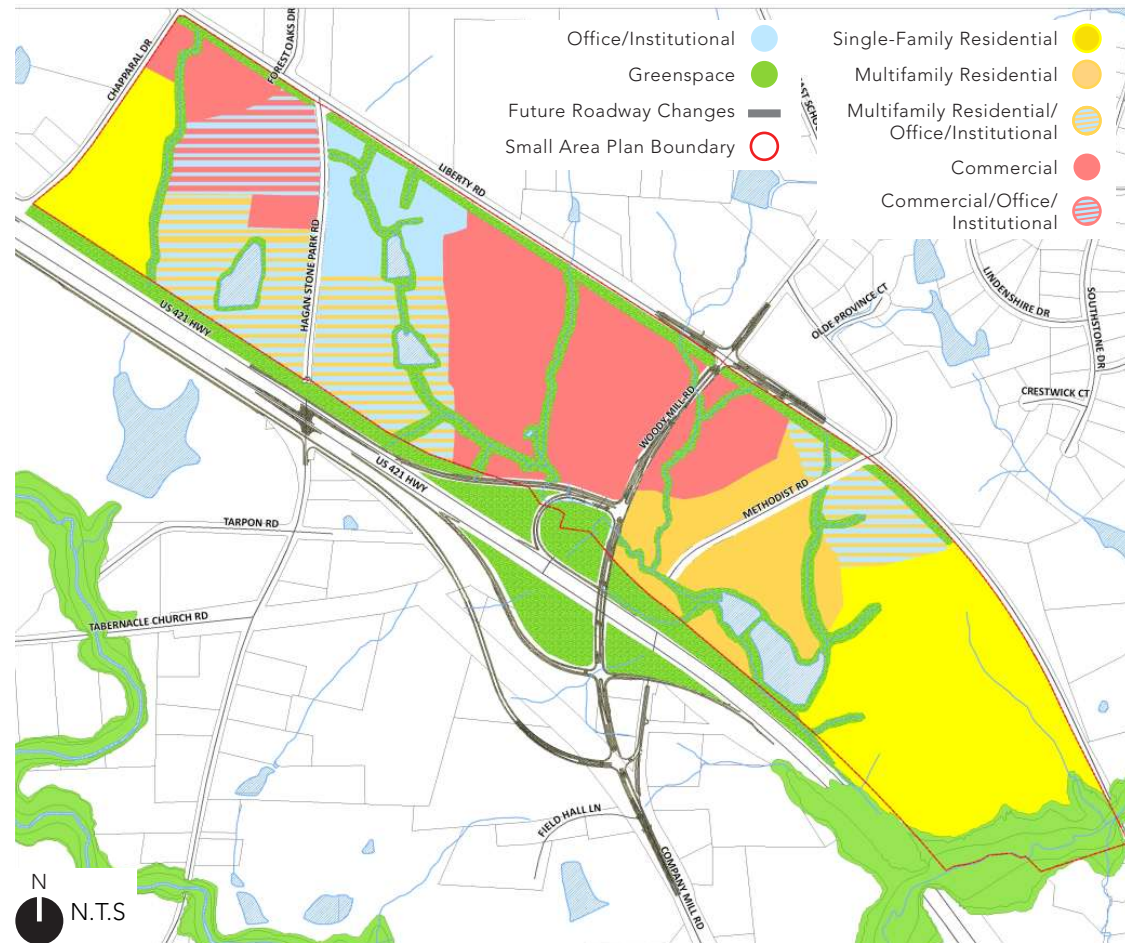
LIBERTY ROAD/WOODY MILL ROAD VICINITY SMALL AREA PLAN

The *Liberty Road/Woody Mill Road Vicinity Small Area Plan* was adopted in March 2011. The Plan builds on the *2008 Alamance Creek Area Plan Update* recommendations and is spread across an area of 275 acres bounded by Highway 421, Chapparral Drive, Liberty Road, and Big Alamance Creek. The Plan was developed as a result of a robust public engagement process involving a Citizen's Committee comprised of area residents, property owners, business owners, and community leaders who spearheaded the planning process. The Plan identified the following goals to guide development in the area:

- **Goal A:** Create a unique and appealing built-environment that encourages area residents to shop and work locally and continue to call the area home while enticing people from outside the area to visit.
- **Goal B:** Ensure that transportation improvements keep pace with development but also take into account the effect future growth will have on the area in order to best mitigate the increase in traffic that is likely to occur.
- **Goal C:** The Liberty Road/Woody Mill Road Vicinity will develop with an integrated mix of uses, including commercial (retail and services), office/employment, institutional, and residential.
- **Goal D:** The Liberty Road/Woody Mill Road Vicinity's valuable assets, such as easy access to Greensboro, water and sewer availability, and institutional partners will be leveraged to help the area realize its full economic potential.

Map 4 shows the proposed land use map developed as part of the Small Area Plan.

Map 4. Liberty Road/Woody Mill Road Vicinity Small Area Plan - Future Land Use



Liberty Road/Woody Mill Road Vicinity Small Area Plan Proposed Land Use

Policy C.1.b. under the Plan's Land Use recommendations states "As the area continues to develop, the future land use map should continue to be scrutinized and revised as necessary, to reflect changes in development, demographic, and market trends." Existing conditions in the study area have changed since 2011. The development of the Greensboro Randolph Megasite with a Toyota battery plant and the City's need to carefully allocate limited capacity for water and sewer service require a new approach to development patterns and uses within the Hwy 421 corridor. These changes offer opportunities for both the City and County as this corridor is now emerging as a key location for new jobs and the types of uses and amenities they can provide for the region. While the Future Land Use Plan (Map 14) proposed for this study area is focused on developing employment centers, careful attention has been paid to provide adequate housing options for future residents as well as to promote compatibility with existing neighborhoods. The Plan promotes mixed-use development and allows missing-middle housing options such as duplexes, triplexes, quadplexes, and townhomes. The missing-middle housing (allowed in the "Medium-Density Residential" land use designation) also serves as buffer between lower-density residential and higher intensity uses. About 69% of the area is designated for residential use with 39% allotted to "Rural Residential" and 25% allotted to "Low Density Residential".

GUILFORD COUNTY
PLANNING AND DEVELOPMENT DEPARTMENT
GUILFORD COUNTY, NORTH CAROLINA

LIBERTY ROAD / WOODY MILL ROAD VICINITY

SMALL AREA PLAN

ADOPTED BY THE GUILFORD COUNTY
BOARD OF COUNTY COMMISSIONERS ON MARCH 17, 2011

CITIZENS' COMMITTEE MEMBERS

Tom Ammeter	Terry Lee
Lonnie Baxley	Denise Osborne
Alan Branson	Dan Rogers
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Mike Kirkman, City of Greensboro Planning Department
Craig McKinney, Greensboro Urban Area Metropolitan Planning Organization

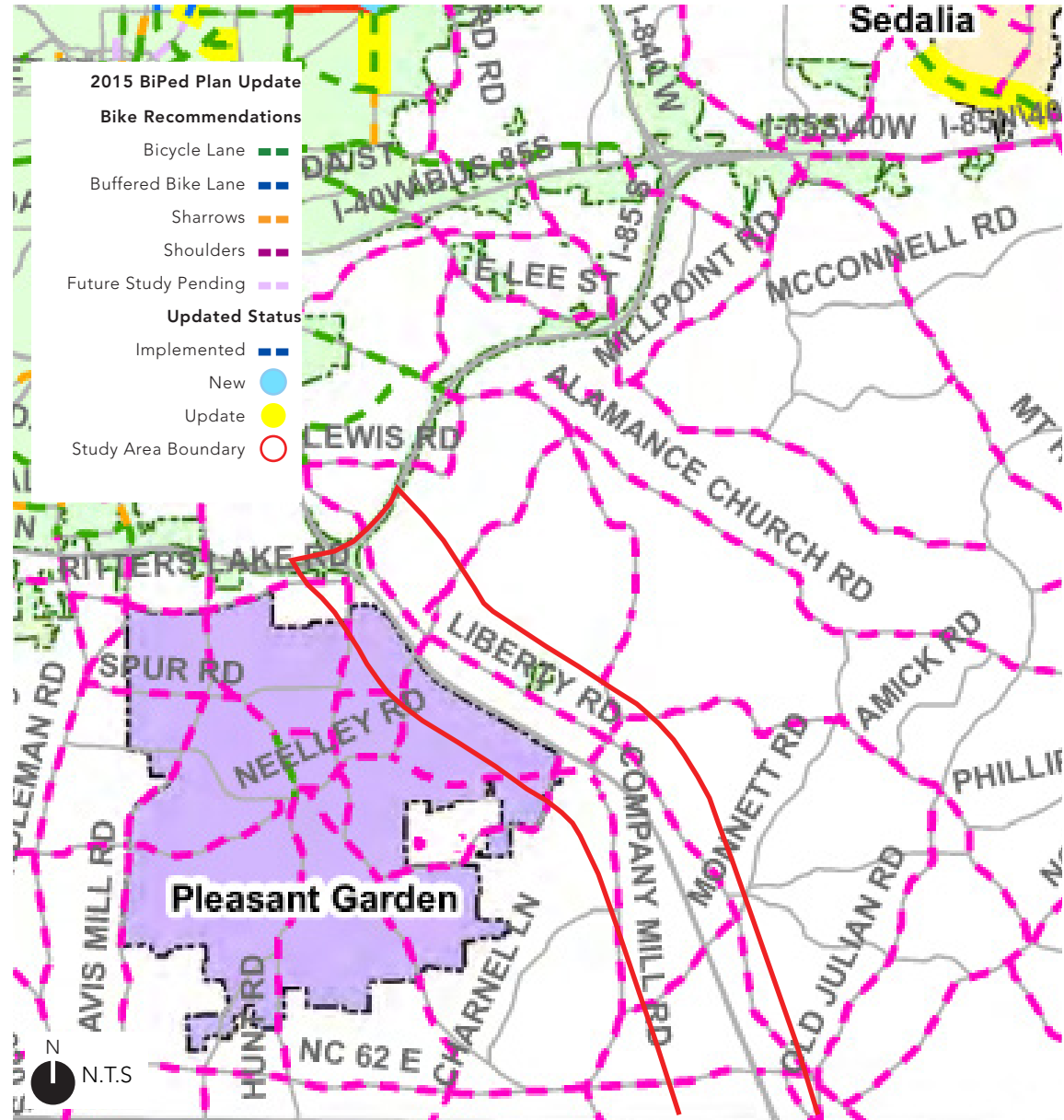
Bicycle, Pedestrian, Trails and Greenways Plan Update

This Plan was adopted by the Greensboro Urban Area MPO in 2015 and last amended in 2018. The goals of the plan focus on supporting mobility, safety, health, the economy, and the environment. The Plan promotes implementation of bicycle and pedestrian infrastructure throughout the City and surrounding region. Paved shoulders at least four foot wide are identified as essential improvements for both bicyclists and pedestrians in more rural areas with narrow, high-speed roadways. This plan was used to inform the development of the Circulation Plan, shown on page 44.

2045 Greensboro Urban Area MPO Metropolitan Transportation Plan (MTP)

The 2045 Metropolitan Transportation Plan (MTP) addresses surface transportation modes, including highway, railway, public transit, bicycle and pedestrian, intermodal connections, and aviation connections in the Greensboro Metropolitan Planning Area. The Greensboro-Randolph Megasite will attract advanced manufacturers to the area and will have a major impact on the traffic and freight flow in the region. The Plan mentions efforts underway to designate Highway 421 from I-85 to I-95 as Interstate 685 to serve the megasite.

Map 5. 2015 BiPed Plan Update



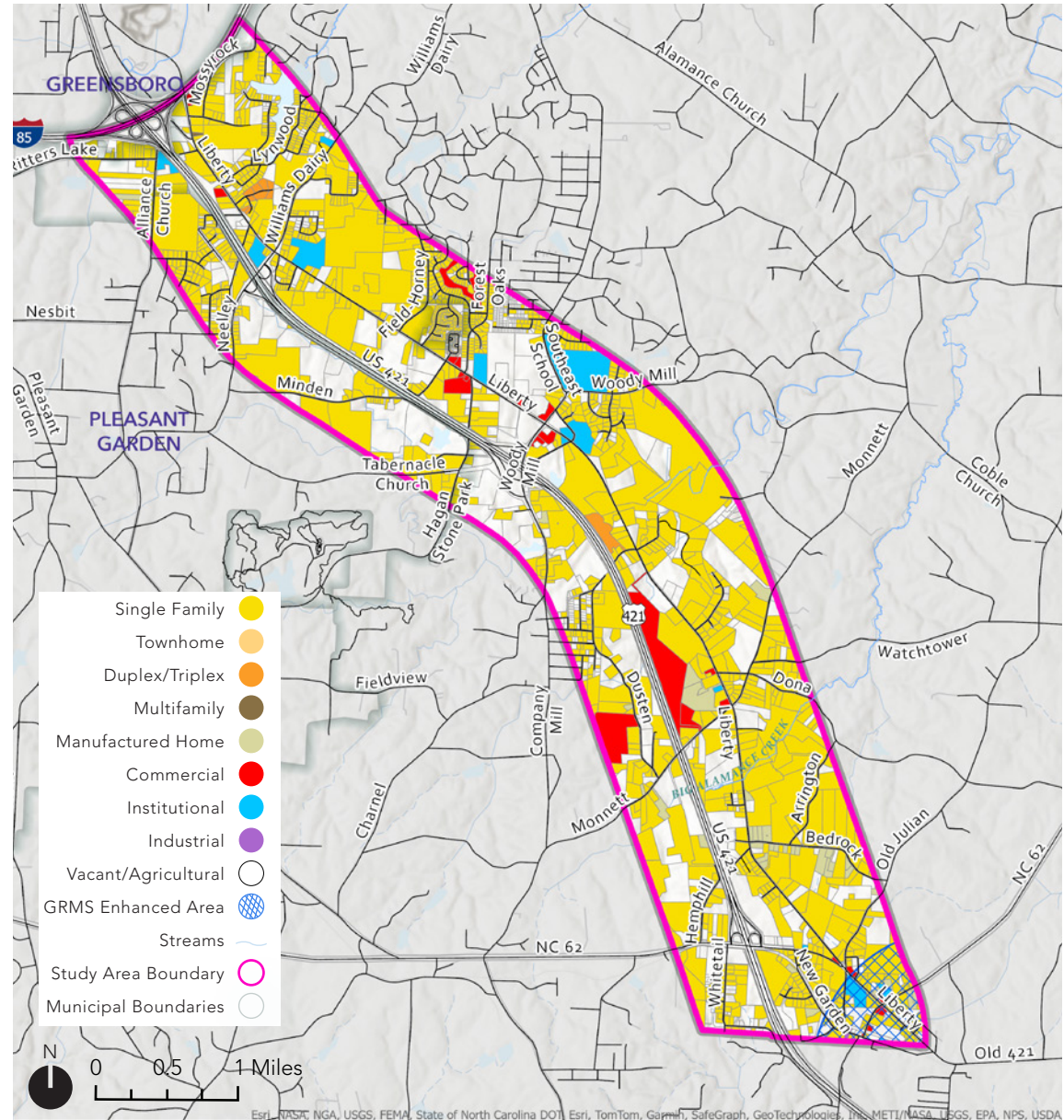
LAND USE

Existing Land Use

Map 6 shows the existing land use for the study area. Single-family residential (55%) occupies a majority of the study area followed by vacant land (26%). The study area has considerable vacant land available for development.

LAND USE CATEGORY	AREA		DWELLING UNITS
	ACRES	%	
Residential	4,575	56.7%	1,635
Single Family	4411.1	54.6%	1,522
Townhome	3.8	0.0%	46
Duplex/Triplex	33.9	0.4%	20
Multifamily	1.1	0.0%	4
Manufactured Home	125.1	1.5%	43
Commercial	209	2.6%	0
Institutional	172.3	2.2%	0
Industrial	1.6	0.0%	0
ROW	988.4	12.2%	0
Vacant	2125.8	26.3%	0
Total	8,072.0	100%	1,635

Map 6. Existing Land Use

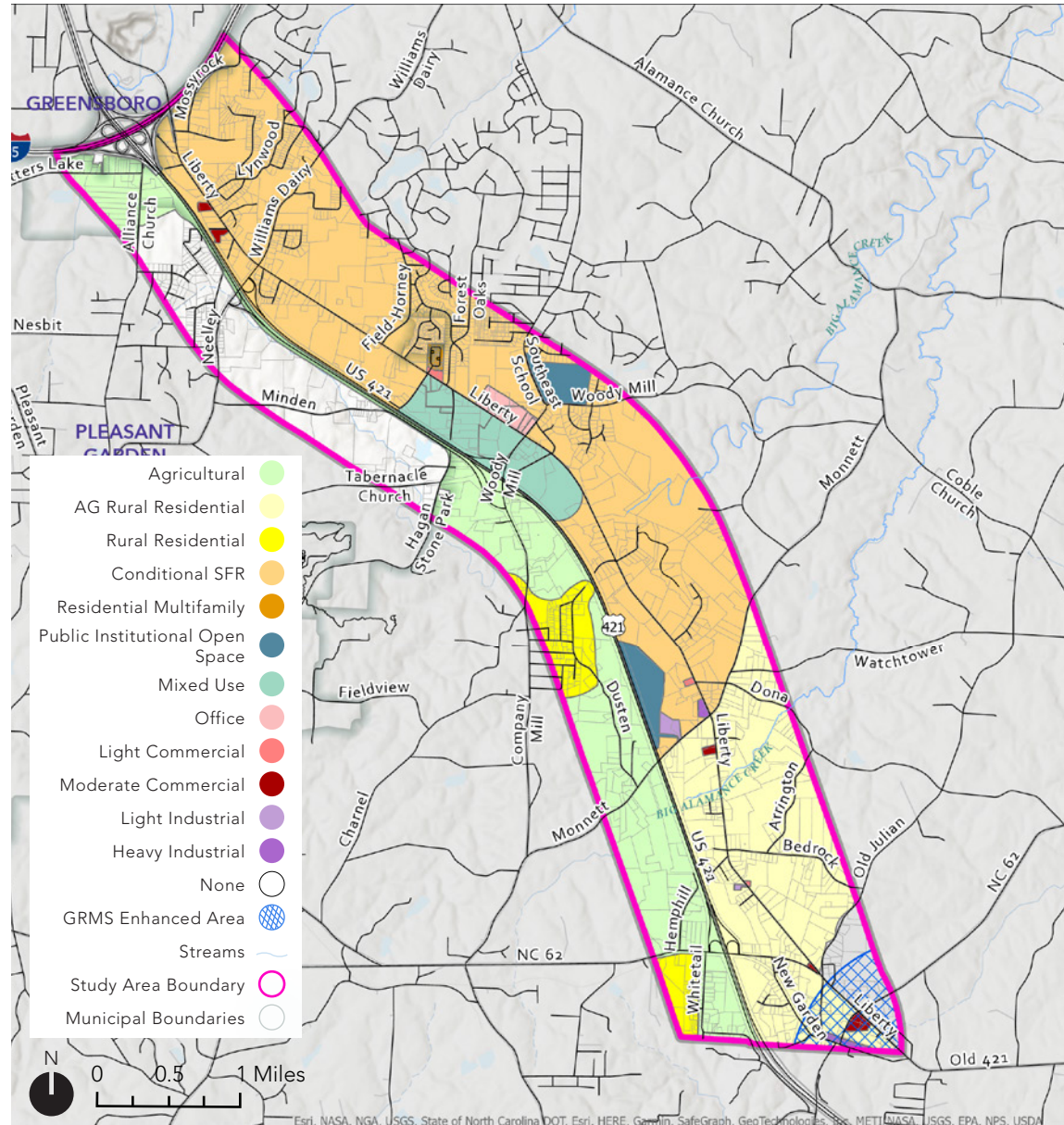


Future Land Use

Map 7 shows the future land use for the study area and is based on the future land use plan shown in the *Guilford County Alamance Creek Area Plan* and *Southern Area Plan*. As per the future land use plan, in each of these plans mixed use development is concentrated along Woody Mill Road bounded by Liberty Road and Highway 421. This mixed use area shown in the map indicates the location of the *Liberty Road/Woody Mill Road Vicinity Small Area Plan* study area. Light and heavy industrial uses are concentrated along the intersection of Monnett Road with Liberty Road and Highway 421. The majority of the study area is proposed to be developed as conditional single-family residential, rural residential, and agricultural uses. Supportive land uses such as public/institutional, open space, offices, and commercial development are scattered throughout the study area. The recommended future land use plan will help inform the scenario development for the study area.

The future land use plan also identified commercial centers, special areas, and trail connections as discussed in the previous sections.

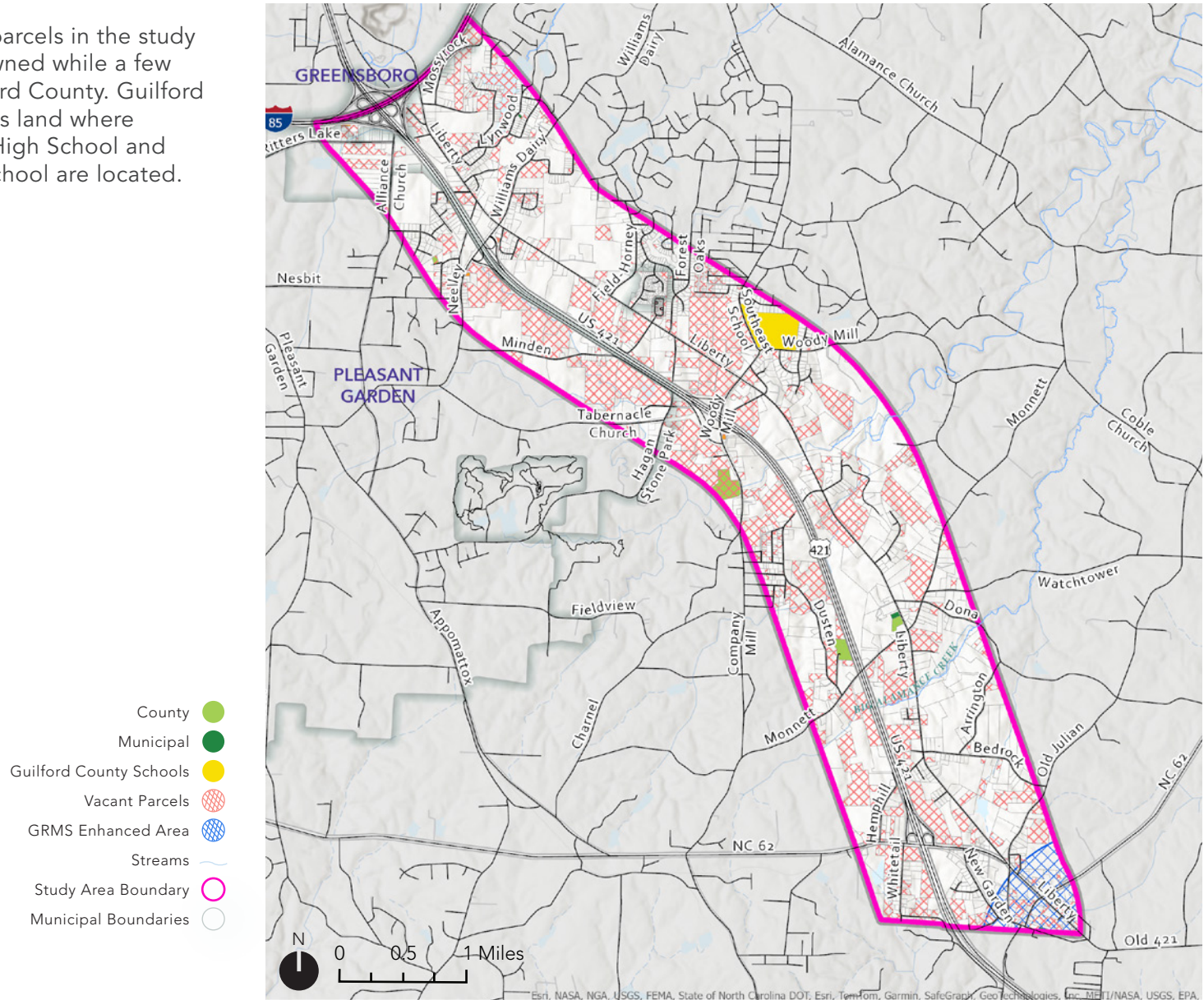
Map 7. Future Land Use



Land Ownership

Most of the vacant parcels in the study area are privately owned while a few are owned by Guilford County. Guilford County Schools owns land where Southeast Guilford High School and Southeast Middle School are located.

Map 8. Land Ownership

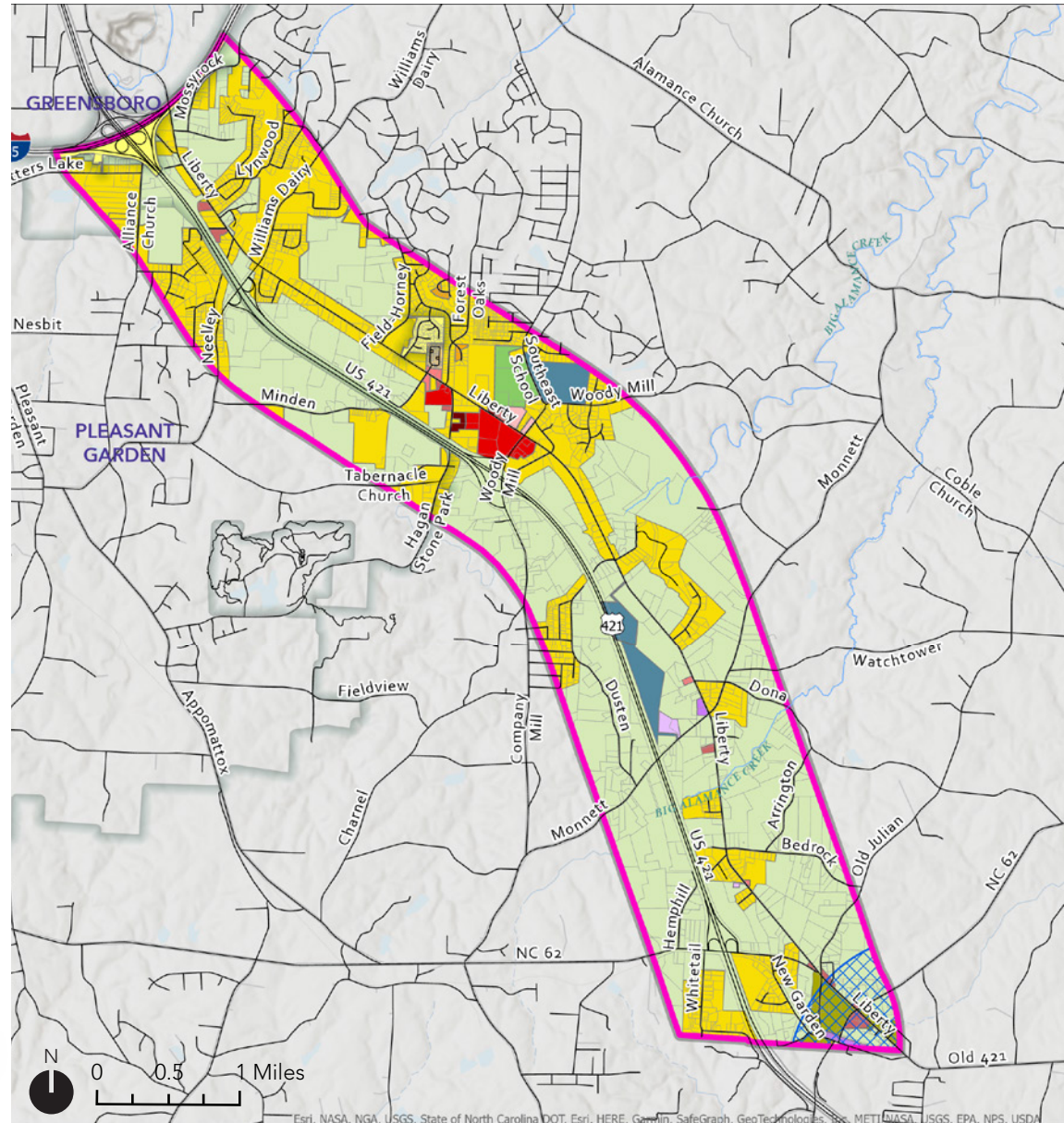


Zoning

Map 9 shows the existing Guilford County zoning designations in the study area. The area contains predominantly agricultural and residential zoned properties with civic, commercial, and industrial zoning designations scattered across the study area.

Map 9. Zoning

- | | |
|-------------------|----------------------|
| AG Agriculture | SC Commercial |
| R-3 Residential | GO-M Commercial |
| RM-5 Residential | LI Industrial |
| RS-20 Residential | HI Industrial |
| RS-30 Residential | PD-R PUD District |
| RS-40 Residential | GRMS Enhanced Area |
| PI Civic | Streams |
| LO Commercial | Study Area Boundary |
| LB Commercial | Municipal Boundaries |
| HB Commercial | |










UTILITY SERVICE

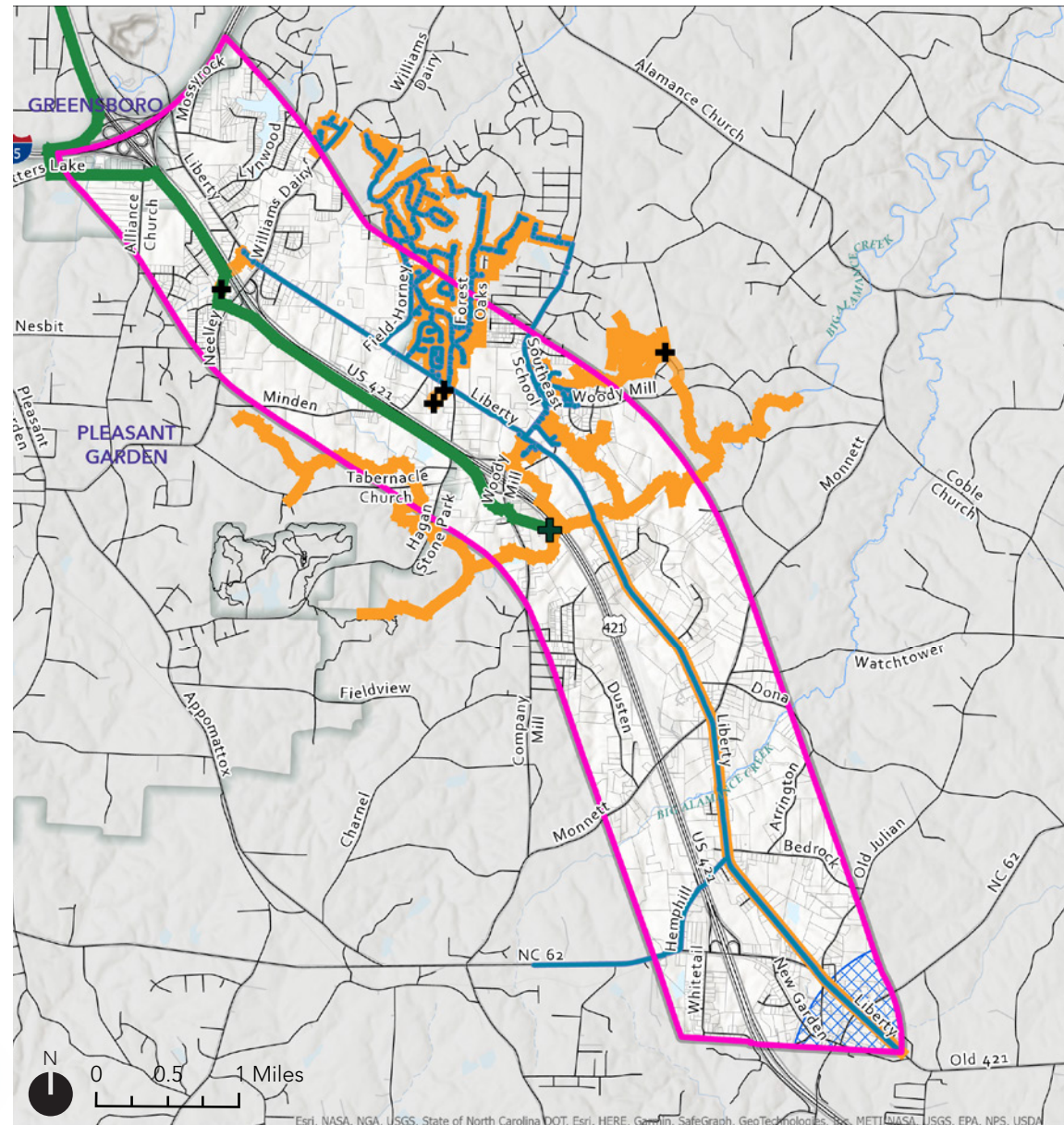
Understanding the location of existing and proposed utilities and services will be crucial in developing the potential land use scenarios for the study area. The City of Greensboro plans to extend utilities and services in the study area, primarily for the operation of Toyota Plant, as shown in Map 10.

According to the *Alamance Creek Area Plan* and verified by existing activity, the City is extending water and sewer lines along Liberty Road to serve the Megasite. A part of the study area falls within Growth Tier 3 of the Water and Sewer Service Boundary. The Water line has already been extended to the study area.

In addition, Pleasant Garden was allotted approximately \$11 million in American Rescue Plan Act (ARPA) funds (\$5.5M from Guilford County and \$5.5M from the State of North Carolina), for water and sewer planning, design, and improvements. While the proposed infrastructure improvements in Phase 1 do not extend to the study area, there is potential for future connections in the next phases.

- | | | | |
|--------------------------|---|----------------------|---|
| Lift Station | + | GRMS Enhanced Area |  |
| Alternative Lift Station | + | Streams |  |
| Alternative Force Main |  | Study Area Boundary |  |
| Wastewater Line |  | Municipal Boundaries |  |
| Water Line |  | | |

Map 10. Utility Service



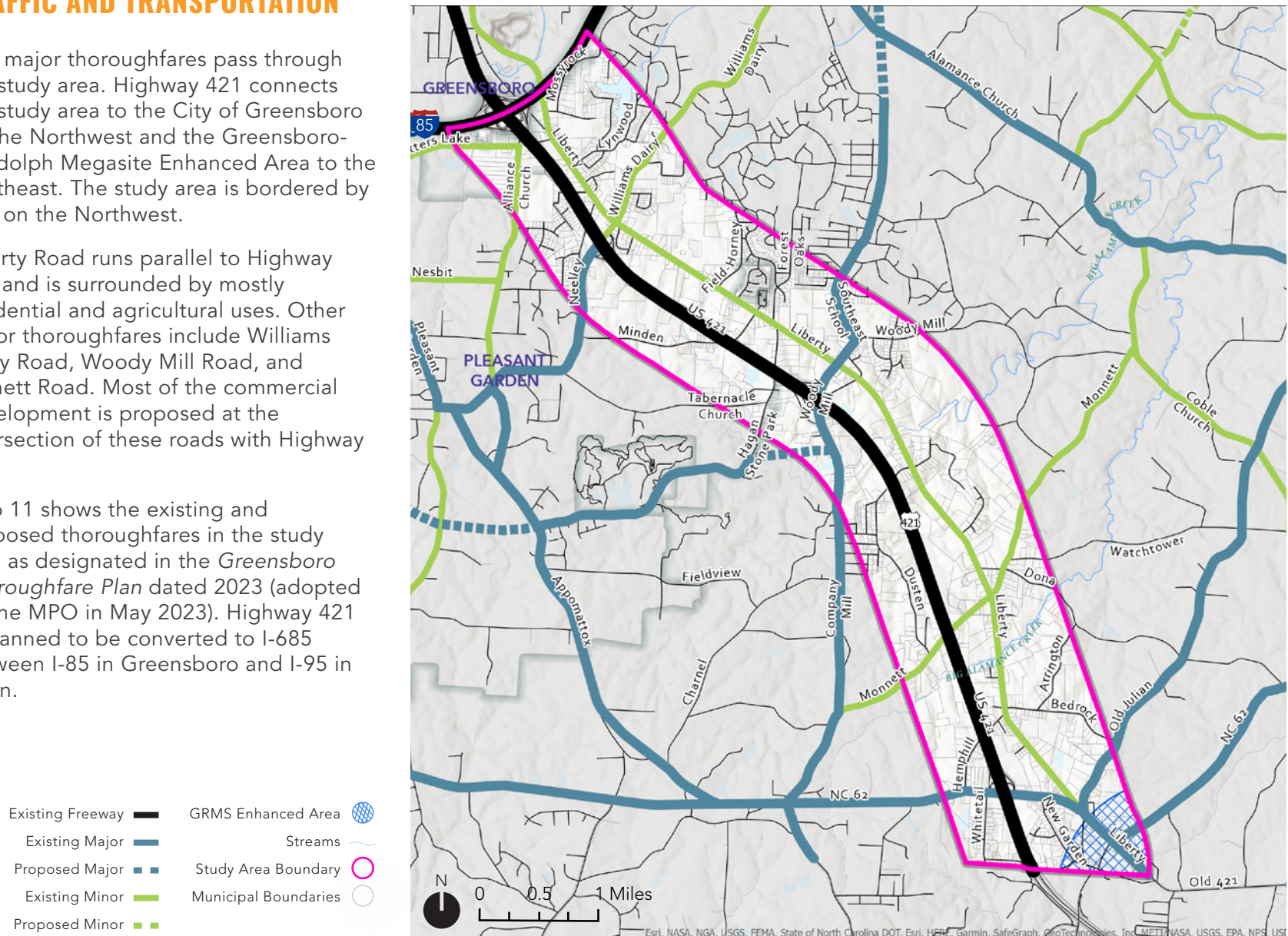
TRAFFIC AND TRANSPORTATION

Two major thoroughfares pass through the study area. Highway 421 connects the study area to the City of Greensboro on the Northwest and the Greensboro-Randolph Megasite Enhanced Area to the Southeast. The study area is bordered by I-85 on the Northwest.

Liberty Road runs parallel to Highway 421 and is surrounded by mostly residential and agricultural uses. Other minor thoroughfares include Williams Dairy Road, Woody Mill Road, and Monnett Road. Most of the commercial development is proposed at the intersection of these roads with Highway 421.

Map 11 shows the existing and proposed thoroughfares in the study area as designated in the *Greensboro Thoroughfare Plan* dated 2023 (adopted by the MPO in May 2023). Highway 421 is planned to be converted to I-685 between I-85 in Greensboro and I-95 in Dunn.

Map 11. Existing and Proposed Thoroughfares



REGULATORY AND POLICY FRAMEWORK

The existing City and County zoning and subdivision regulations will guide development in the study area and impact the scenario development.

EXISTING REGULATIONS AND EFFECTS ON DEVELOPMENT

City of Greensboro Land Development Ordinance

The intersection of I-85 and Highway 421 is zoned as Scenic Overlay District 2 with Scenic Overlay District 1 extending on either side of I-85.

Guilford County Code

Most of the study area is zoned as R-3 Residential and AG Agriculture Districts. Commercial Districts are concentrated at the intersection of Liberty Road and Woody Mill Road.

Liberty/Woody Mill Overlay District

The Liberty Road/Woody Mill Overlay District was adopted by Guilford County to promote mixed-use development between Liberty Road and Highway 421 at Woody Mill Road. The Guilford County Code provides architectural standards for non-residential, attached single-family, and multi-family development, and building height standards. In addition, pedestrian improvements including sidewalks along all public and private streets in a major subdivision or any project proposing new non-residential, attached single-family, or multi-family development are required. Sidewalks shall also be built along private driveways that provide access to one or more lots or uses.

Town of Pleasant Garden

On the west side of Hwy 421, the study area includes properties located within the jurisdiction of the Town of Pleasant Garden. Higher-intensity uses are clustered near the intersection of Hwy 421 and Woody Mill Road just north of Big Alamance Creek. This location was identified in the site selection model as a key opportunity for primary employment-based economic development. This is also an area where space is available to properly screen and buffer these uses from existing rural residential and vacant properties. Available land for open space, parks and trails should be identified, preserved and used to connect these areas with the larger mixed-use corridor to the north and west.

Development anticipated in this area is dependent on municipal utilities that can support low- and medium-density residential, employment center, industrial and moderate commercial uses. Interlocal agreements and communication between the City of Greensboro and Town of Pleasant Garden need to identify specific shared goals and strategies for extending services that will support desired growth with performance standards that are shared by new development throughout the study area in a manner that benefits the region.

ENVIRONMENTAL CONSTRAINTS

Falcon Engineering Inc. prepared a Land Use Constraints Report to identify sites within the study area with land use constraints. The findings of the report were then used to inform the Site Suitability Analysis and selection of the Prime Development Sites shown on page 59.

KEY FINDINGS

Waters of the US

The study area is located in the Jordan Lake sub-watershed. The NC General Statutes and NC Administrative Code include additional restrictions for identified waters of the US (e.g., wetlands, streams, and open water). Waters of the US within the study area include the following, in addition to several unnamed tributaries and small ponds:

- Little Alamance Creek
- Big Alamance Creek
- Beaver Creek
- Climax Creek
- North Prong Stinking Quarter Creek
- Lynwood Lake

Notable restrictions affecting development and land use include the following:

- Riparian buffers to protect surface water along creeks and lakes.
- The creeks are designated as “Class C”, which allows for secondary contact recreation such as wading, boating, and other purposes with limited human contact with the water.

Federal, State, and Local Historic Resources

Eighteen sites within the study area are identified on the NC State Historic Preservation Office’s website; however, 17 are designated as “Survey Only” with no historical designation applied, two of which are no longer located at the indicated site.

Only one site is listed on the National Registry of Historic Places: the Tabernacle Methodist Protestant Church and Cemetery at 5601 Liberty Road. The church was built in 1891 and the cemetery was established in 1822. In 1995, a new sanctuary was built adjacent to the historic site, which is the current location of most church activity on the property. The site’s inclusion on the National Registry indicates that it is an important local asset that should be considered and preserved for future generations.

Threatened and Endangered Species, and Their Critical Habitat

The study area is home to two rare species of freshwater mussels – the Eastern Creekshell (*Villosa Delumbis*) and Carolina Creekshell (*Villosa Vaughaniana*). According to the North Carolina National Heritage Program (NCNHP), the Eastern Creekshell is considered “Significantly Rare” and “Apparently Secure” which the NHP defines, respectively, as:

...Any species which has not been listed as an Endangered, Threatened, or Special Concern species, but which exists in the state (or recently occurred in the state) in small numbers (generally fewer than 100 statewide populations) and has been determined by the NCNHP to need

monitoring. Significantly Rare species include species of historical occurrence with some likelihood of rediscovery in the state and species substantially reduced in numbers by habitat destruction, direct exploitation, or disease. ...

Apparently secure and widespread in North Carolina, usually with more than 100 occurrences and more than 10,000 individuals.

The NCNHP identifies the Carolina Creekshell as “Endangered” and “Vulnerable”:

Any native or once-native species of wild animal whose continued existence as a viable component of the State’s fauna is determined by the Wildlife Resources Commission to be in jeopardy or any species of wild animal determined to be an ‘endangered species’ pursuant to the Endangered Species Act. ...

Vulnerable to extinction in North Carolina either because rare or uncommon, or found only in a restricted range (even if abundant at some locations), or due to other factors making it vulnerable to extirpation. Typically 21 to 100 occurrences or between 3,000 and 10,000 individuals or 10,000- 50,000 acres occupied in the state.

No critical habitats have been identified within the study area.

Potential Recognized Environmental Concerns

The study area does not include any of the following, according to the North Carolina Department of Environmental Quality website:

- Superfund National Priorities List Sites
- Inactive Hazardous Sites
- Manufactured Gas Plants
- Pre-Regulatory Landfills
- Brownfield Sites
- Federal Remediation Sites

The study area does include a Hazardous Waste Site, Master Kleen drycleaners, which was located along Liberty Road near Hagan-Stone Road. This business has closed and been replaced by a gas station, including an Underground Storage Tank (UST) for gasoline, which is the only commercial UST within the study area.

The complete Land Use Constraints Report is included in Appendix C.

SITE SUITABILITY ANALYSIS

Colliers Engineering and Design conducted an Industrial Site Analysis to review the 2,290 parcels within the Greensboro Highway 421 Land Use Study planning area. The purpose of the analysis was to determine the most highly desirable industrial properties within the planning area to be considered by the City and incorporated into the planning scenarios for the Highway 421 Corridor. The report is included in Appendix B.

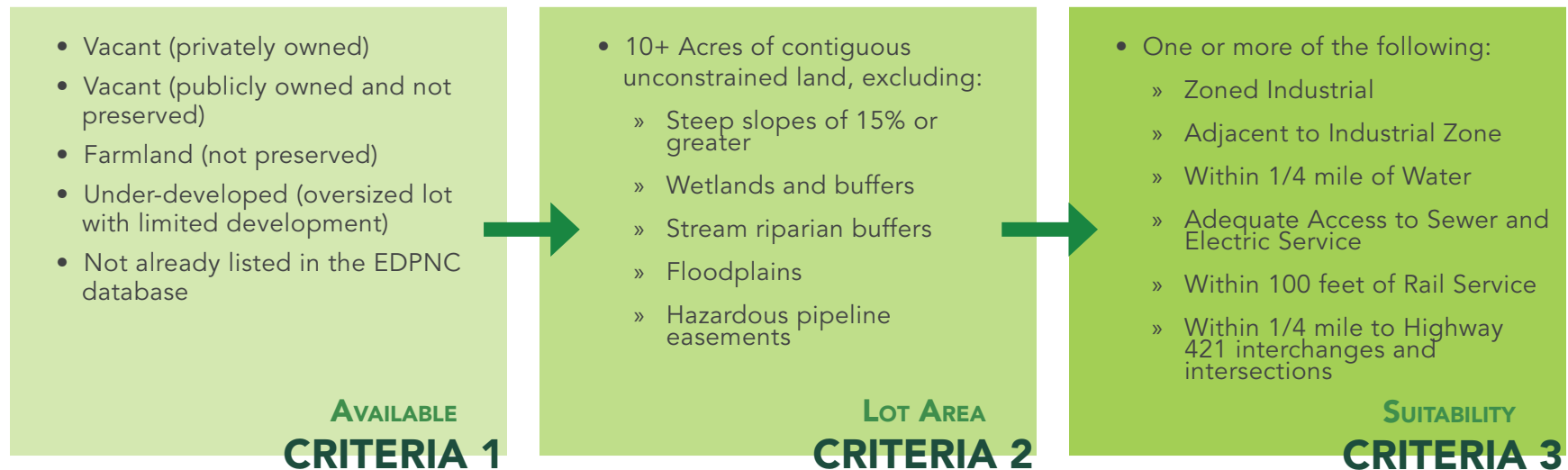
The site selection criteria are summarized below.

SITE SELECTION CRITERIA

Primary Criteria for suitable parcels

- 10+ Acres and Undeveloped or Vacant, including Agricultural / Horticulture lands
- 10+ Acres and Zoned Industrial
- 10+ Acres and Adjacent to Zoned Industrial Parcel
- 10+ Acres along Highway 421 (Future I-685)
- 10+ Acres and adequate access to Sewer Service

- 10+ Acres and within 1/4 miles of Water Service
- 10+ Acres and on-site (within 100') Rail Service
- 10+ Acres of contiguous unconstrained land (excluding acreage of steep slopes of 15% or greater, wetlands and wetland buffers, stream buffers, floodplains, and the hazardous pipeline.)
- Not already listed in the Economic Development Partnership of North Carolina (EDPNC) database



KEY FINDINGS

Discussions were held with the City and the Greensboro Chamber of Commerce staff during stakeholder interviews and subsequent correspondence regarding the minimum acreage size for potential industrial sites and preferred distance to the Greensboro-Randolph Megasite, sewer, water, and rail services.

An industrial site-related criteria was drafted and reviewed by the City, shown in the previous section. Comments from the City were incorporated into the final document with criteria weighted based on zoning, rail access, access to Highway 421 interchanges and intersections, and infrastructure related criteria for water, sewer, electrical service, and natural gas.

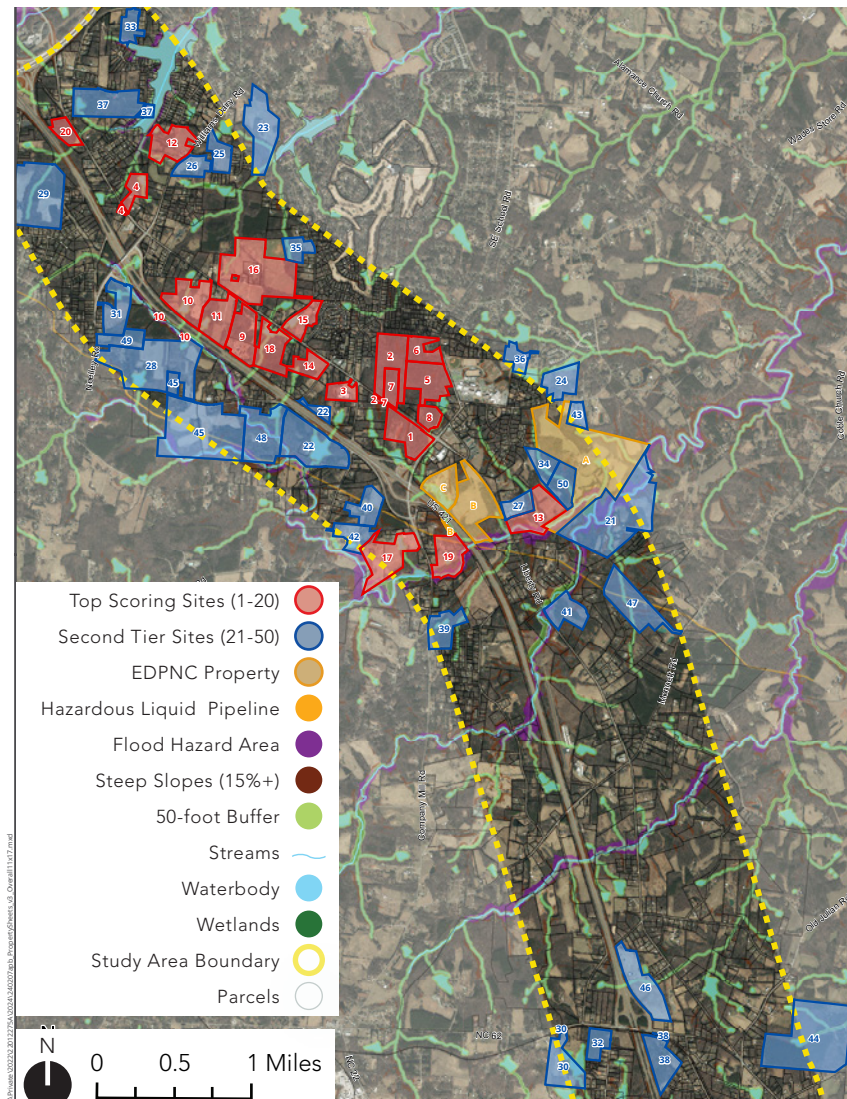
Based on the site selection criteria, 50 potential industrial sites were identified out of the 2,290 parcels. These were classified into the following categories as shown in Map 12:

- Top Scoring Sites (1-20)
- Second Tier Sites (21-50)
- EDPNC Property

The data sheets corresponding to each of the top scoring properties (1-20) are shown in Appendix B.

An internal City staff team further shortlisted the potential sites to top ten most desirable industrial sites. These top 10 sites provided guidance for developing the recommended planning scenario for the study area.

Map 12. Industrial Site Analysis - Overview of Results



2 PLANNING SCENARIO



INTRODUCTION

This chapter provides a planning framework for future development and growth along Highway 421 within the study area. The proposed future land use plan presented in this chapter was developed based on the analysis of existing conditions and adopted plans detailed in the previous chapter, stakeholder input, best practices, and market research. The future land use plan is supplemented by recommended transportation connections and open space improvements to sustain the population growth resulting from economic development in the area. The chapter also outlines goals and strategies to help ensure resilient, sustainable, and economically vibrant development and redevelopment are realized.

This chapter provides:

- An overview of the selected planning scenario for the Highway 421 Corridor including proposed land uses;
- A detailed description of the proposed land uses and proposed transportation connections for the Highway 421 Land Use Study;
- An overview of development and redevelopment opportunities and recommended strategies for implementing the future land use plan.

All photos used in this chapter are property of Freese and Nichols, Inc.

PLANNING SCENARIO SELECTION

The project team developed three planning scenarios based on the site suitability analysis, environmental constraints, and existing conditions analysis. The three scenarios are described below. Maps corresponding to each scenario are shown in Appendix A.

Planning Scenario 1: Industrial Hub

Scenario 1 focuses on advanced manufacturing and spin-off industries for the nearby Toyota Megasite. This scenario is a significant generator of employment opportunities, attracting and accommodating a diverse and skilled workforce. Industries typically include automotive, electronics, aerospace, biotechnology, warehousing, logistics, and distribution users. Other supporting uses may include clusters of restaurants, fuel stations/truck stops, and hotels at key nodes.

Planning Scenario 2: Innovation District

Scenario 2 is a state-of-the-art employment center, emphasizing research and development, innovation, and partnerships with businesses and higher education institutions. The inclusion of mixed-use development is another defining feature of this scenario, incorporating retail and high-density residential at key locations, adding convenience, walkability, and economic diversity to the area.

Planning Scenario 3: Integrated Neighborhoods

Scenario 3 focuses on building a more complete community with the integration of residential variety into industrial and commercial development. This approach enables workers to live near their place of employment, reducing commuting time, expenses, and vehicle miles traveled. Connectivity is a core principle in this area, with walkable and bikeable connections between homes, places of employment, and other public centers.

PREFERRED SCENARIO



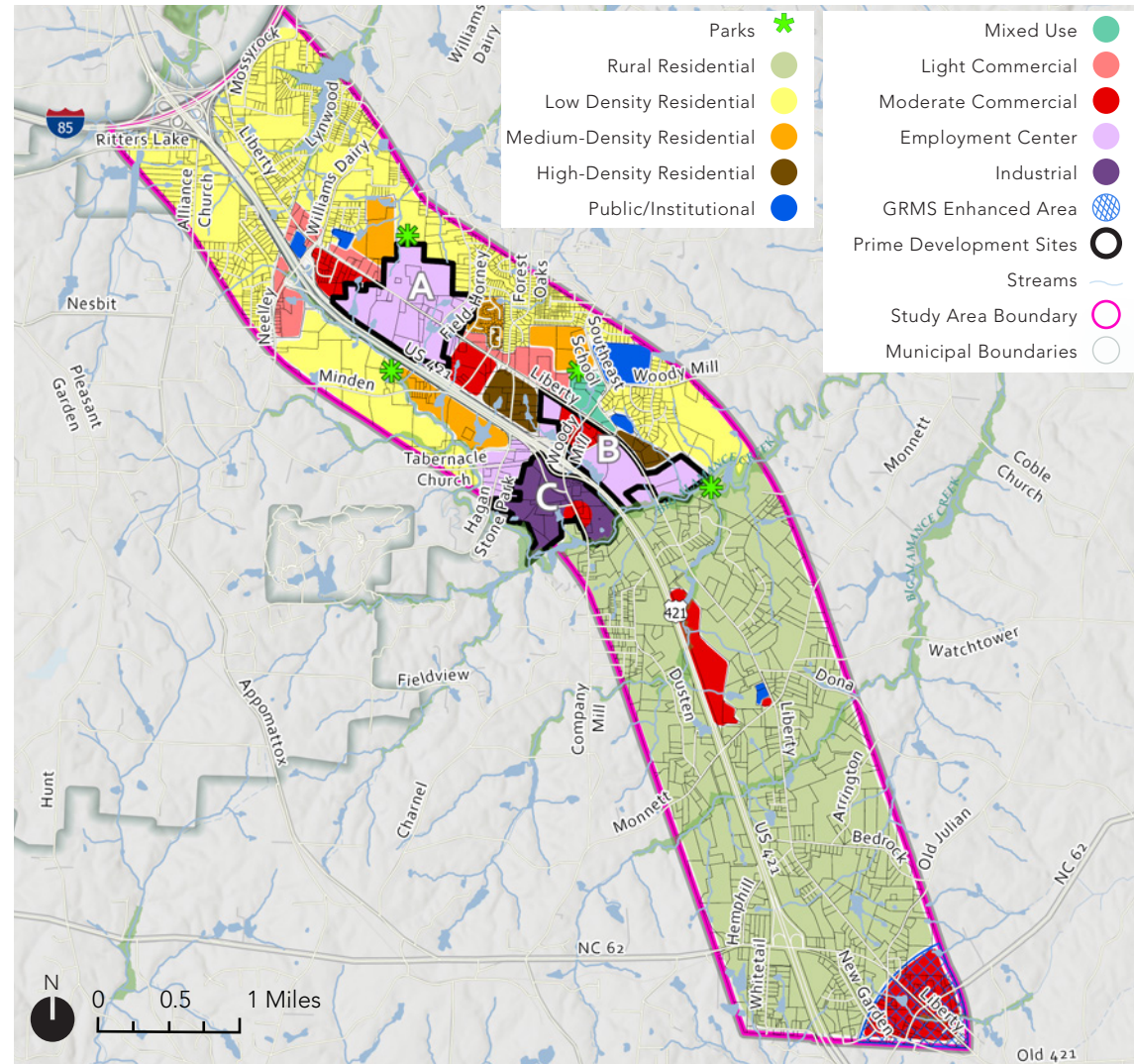
The scenarios were evaluated to provide a planning framework in the study area. Based on staff and stakeholder feedback, Scenario 1 was selected as the preferred planning scenario to guide future land use and transportation connections in the study area. The selected scenario is elaborated in the next section.

FUTURE LAND USE PLAN

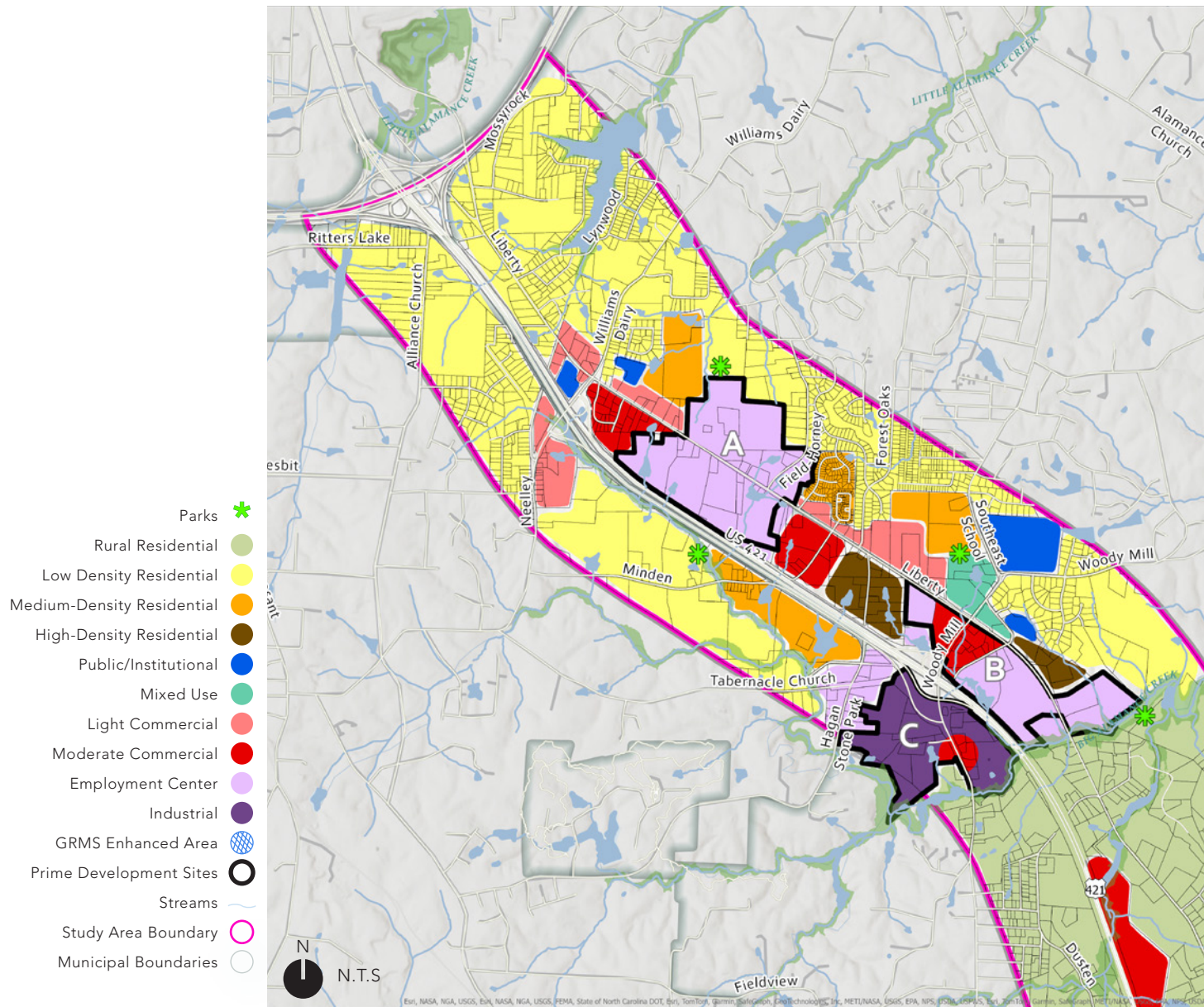
The Future Land Use Plan (FLUP), developed from the scenarios, aims to increase the density of development, provide strategically-located recreational opportunities in the form of open spaces connected by trails, complemented by shopping and eating destinations for residents and visitors, diverse housing options, and multi-modal transportation connections. The proposed plan intends to improve the overall quality of life in the area.

LAND USE CATEGORY	AREA		%	
	ACRES			
Rural Residential	3,157.2	5,569.9	39.1%	69%
Low Density Residential	2,043.8		25.3%	
Medium-Density Residential	271.2		3.4%	
High-Density Residential	97.6		1.2%	
Public Institutional	98.0		1.2%	
Mixed Use	46.8	-	0.6%	-
Light Commercial	171.1	636.2	2.1%	8%
Moderate Commercial	465.1		5.8%	
Employment Center	560.7		6.9%	
Industrial	172.0	-	2.1%	-
ROW	988.4	-	12.2%	
Total	8,072.0		100%	

Map 13. Future Land Use Plan



Map 14. Proposed Planning Scenario Prime Development Areas



FUTURE LAND USE DASHBOARDS

Future Land Use Dashboards provide City and County staff, appointed officials, and elected representatives with a one-stop location for information related to the future land use categories reflected on the Future Land Use Plan.

Purpose and Character

Each category section begins with a general description, providing narrative details about the overall intent of and land use makeup of each category. The descriptions are a framework for how each area is expected to develop or redevelop in the future.

Appropriateness Table

The appropriateness tables show the ratio of residential and non-residential uses expected for that category as well as the expected mix of development types present under each of those. These uses can take the form of several different development types; for example, an office use could appear in a complete neighborhood, an employment center, a shopping center, or an activity center, or even a neighborhood depending on its scale, form, and context.

The appropriateness of each development type within a land use category is illustrated using a scale of 0-3 shaded dots.

- **0 shaded dots:** Not appropriate
- **1-2 shaded dots:** Appropriate under certain conditions
- **3 shaded dots:** Overall appropriate

To note, parks, open space, and civic uses are considered appropriate across all Land Use Categories and are considered appropriate in both residential and non-residential developments, and are therefore not called out separately in the development ratios.

Photo Examples

Photo examples are provided for each land use to provide visual illustration of the type of development appropriate for the land use. Examples are for illustrative purposes only and not intended to reflect exact design or development standards.

Density, Intensity, and Scale

DENSITY

The term housing or dwelling unit refers to a single space that provides for all the necessities of living, meaning it has complete sleeping and living areas plus at least one bathroom and kitchen.

The term density refers to the number of dwelling units located in a specific area, noted as an amount per acre. This Plan uses dwelling units per acre to measure residential density. Each category includes the target range of densities appropriate for that land use.

INTENSITY

Intensity refers to how much of a property or lot is built on, with either buildings or accompanying development elements such as driveways and parking areas. For the purpose of this Plan, intensity is defined as:

- **Low:** 0-50% lot coverage
- **Medium:** 50-75% lot coverage
- **High:** 75-100% lot coverage

SCALE

Scale refers to the height of the buildings on a property or lot. For the purpose of this Plan, scale is defined as

- **Low-Rise:** 1 to 2 stories
- **Mid-Rise:** 3 to 4 stories
- **High-Rise:** 5+ stories

DEVELOPMENT TYPES

Each category also includes a set of identified common development types and will have a primary or most desirable development type, accompanied by secondary types with indicated varying levels of appropriateness. This strategy allows the City and County to be flexible with market demands that may change from time to time. Although primary types (i.e., 3 appropriateness dots) should remain consistent throughout the life of the Plan, secondary types (i.e., 1-2 appropriateness dots) have the flexibility to be incorporated into the category so long as they complement the primary type.



Single-Family Detached Homes

One dwelling unit on a lot in a single stand-alone building. Generally, the largest lots of all residential development types with low density, scale, and intensity. Single-family detached homes may include an Accessory Dwelling Unit (ADU) that is clearly secondary to the main property unit. ADUs are often above a garage of the primary unit, or at ground level either attached or detached from the primary unit. ADUs are encouraged to support diversity of housing choice and affordability, for both the people who rent the ADU and the people who own the primary unit, as this rental income can help offset mortgage payments.



Duplex, Triplex, and Quadplex Homes and Townhomes

Two to four multifamily units in a stacked or otherwise connected configuration. This development type also includes townhomes, which are single-family attached units and typically have up to about 8 units per building group.



Multifamily

Five or more units contained within a single building, with units usually stacked on top of each other. Usually, the individual units are for rent (apartments), but may be for sale (condos). A higher-density multifamily development may include multiple buildings on the lot, creating a complex.



Neighborhood Commercial

Less intense commercial development, such as local retail, offices, restaurants, and for residents at a neighborhood scale.



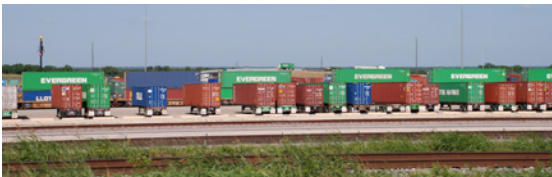
General Commercial

More intense and large-scale commercial development such as big box stores, chain restaurants, offices, hotels usually located at major thoroughfares. General Commercial uses need to be buffered from single-family residential development to reduce potential conflicts between the use's nuisances.



Light or Flex Industrial

Light or Flex Industrial is manufacturing, processing, assembly, warehouse, and similar uses that do not generate nuisances (noise, odor, dust, etc.) and are able to house the entire operation inside the building, meaning there are no materials/products stored or work occurring outdoors. They also produce less heavy truck traffic than "heavier" industry. This may include buildings that can adapt to and house a variety of tenants and uses, such as offices, warehouses, and production or research space.



Heavy Industrial

Industrial uses (manufacturing, processing, assembly, warehousing and similar) that do not fit under Light or Flex Industrial above.



Parks and Open Space

Consists of parks, recreational facilities, and open spaces. Generally considered appropriate or compatible within all land use categories. Park design should be contextually sensitive and provide the types of amenities appropriate for the surrounding land uses. This means parks and open spaces in residential versus non-residential areas may be very different.

Rural Residential

Purpose and Character

This land use category accommodates agricultural uses and large-lot detached single-family residential development. Residential areas in this category may differ from the traditional neighborhood pattern due to the low-density, large lot configuration. Typically, the units in this land use category are not connected to public utilities.

DEVELOPMENT TYPE	APPROPRIATENESS	CONDITIONS
Single-Family Detached Homes	●●●	
Duplex, Triplex, and Quadplex Homes and Townhomes	○●○	
Multifamily	○●○	
Neighborhood Commercial	○●○	
General Commercial	○●○	
Light or Flex Industrial	○●○	
Heavy Industrial	○●○	
Parks and Open Space	●●●	

DENSITY
0-1 units per acre
INTENSITY
Low
SCALE
Low-Rise



Low-Density Residential

Purpose and Character

This land use category primarily includes low-density detached single-family residential development in a more traditional neighborhood setting as compared to Rural Residential. Additional residential types such as duplexes and townhomes, introducing some “Missing Middle” opportunities, may be appropriate. Other uses may be appropriate based on compatibility with adjacent uses and the availability of public services and utilities. Non-residential uses that support the residential development, such as parks, recreation facilities, and schools, may be appropriate in the area.

DEVELOPMENT TYPE	APPROPRIATENESS	CONDITIONS
Single-Family Detached Homes	● ● ●	
Duplex, Triplex, and Quadplex Homes and Townhomes	● ● ○	Considered appropriate if similar in character and lot standards to single-family detached.
Multifamily	○ ○ ○	
Neighborhood Commercial	○ ○ ○	
General Commercial	○ ○ ○	
Light or Flex Industrial	○ ○ ○	
Heavy Industrial	○ ○ ○	
Parks and Open Space	● ● ●	

DENSITY
2-5 units per acre
INTENSITY
Low
SCALE
Low-Rise



Medium-Density Residential

Purpose and Character

This land use category primarily includes “Missing Middle” housing options. These housing types are recommended to increase variety and choices, aligning with a range of local employment types and income levels. Medium-Density Residential can also serve as a buffer between Low-Density Residential and higher intensity areas. Missing middle housing often exhibits stronger fiscal performance and is also closer to achieving densities supportive of efficient mass transit service.

DENSITY
6-11 units per acre
INTENSITY
Low to Medium
SCALE
Low to Mid-Rise

DEVELOPMENT TYPE	APPROPRIATENESS	CONDITIONS
Single-Family Detached Homes	● ● ●	
Duplex, Triplex, and Quadplex Homes and Townhomes	● ● ●	
Multifamily	● ○ ○	May be considered appropriate if the development is neighborhood scale and located in transition zones to buffer lower density residential uses from more intense uses.
Neighborhood Commercial	● ● ○	Generally appropriate with site design compatible with adjacent lower density uses. Appropriate in that it provides for retail, office, and services at a scale compatible with and supportive of surrounding neighborhoods. Promotes walkability and complete neighborhoods.
General Commercial	○ ○ ○	
Light or Flex Industrial	○ ○ ○	
Heavy Industrial	○ ○ ○	
Parks and Open Space	● ● ●	



Missing Middle Housing

Missing Middle Housing is a term that describes a range of multifamily housing, including low-rise, low-density residential to duplexes to small apartment buildings that complement single-family neighborhoods. These housing types are important because they can provide buffers between low-density and high-density developments and promote incremental change and adaptation rather than transformations that can alter the culture and character of a neighborhood. They also help provide affordable housing options for people in different phases of the housing cycle, including young families, young professionals, and empty-nesters. It is possible to have a mixture of affordable and premium points within missing middle housing.



Source: Freese and Nichols, Inc.

High-Density Residential

Purpose and Character

This land use category is intended to provide multifamily housing with higher density, such as apartments and condominiums. The density of development can vary depending on the location and appropriateness of development. High-Density Residential is most appropriate in areas with nearby employment and other destinations to support walkable, connected development.

DENSITY
12-20 units per acre (Garden Style Apartments)
40-50 units per acre (Modern/Mixed use style apartments)
INTENSITY
Medium to High
SCALE
Low to Mid-Rise

DEVELOPMENT TYPE	APPROPRIATENESS	CONDITIONS
Single-Family Detached Homes	○○○	
Duplex, Triplex, and Quadplex Homes and Townhomes	●●○	Appropriate when integrated in a planned development with a variety of housing types and price points.
Multifamily	●●●	
Neighborhood Commercial	●●●	
General Commercial	○○○	
Light or Flex Industrial	○○○	
Heavy Industrial	○○○	
Parks and Open Space	●●●	



Mixed Use

Purpose and Character

This land use category aims to provide a mix of complementary land uses and may include higher-density residential uses with appropriate office, retail, and commercial uses. Mixed Use development can take the form of vertical (commercial uses on the first floor and residential uses on the top) or horizontal to integrate different uses within the area, though horizontal mixed use in particular requires careful attention to the pedestrian experience to better achieve the benefits of mixed use versus vertical mixed use. Mixed Use development is intended to promote pedestrian and bicycle interconnectivity and may incorporate amenities such as plazas, public seating, and infrastructure for pedestrians and cyclists.

DEVELOPMENT TYPE	APPROPRIATENESS	CONDITIONS
Single-Family Detached Homes	○○○	
Duplex, Triplex, and Quadplex Homes and Townhomes	●●○	Appropriate with higher density missing middle housing.
Multifamily	●●●	
Neighborhood Commercial	●●●	
General Commercial	●●○	Generally considered appropriate to provide essential commercial and retail options to serve adjacent uses.
Light or Flex Industrial	○○○	
Heavy Industrial	○○○	
Parks and Open Space	●●●	

DENSITY
3-20 units per acre
INTENSITY
Low to Medium
SCALE
Low to Mid-Rise



Light Commercial

Purpose and Character

The Light Commercial classification includes a variety of lower-intensity commercial uses at the community level that can be appropriately located adjacent to residential uses with limited negative impacts on those uses. This category is intended to serve as a transition zone between Residential uses and Moderate Commercial uses.

DEVELOPMENT TYPE	APPROPRIATENESS	CONDITIONS
Single-Family Detached Homes	○○○	
Duplex, Triplex, and Quadplex Homes and Townhomes	○○○	
Multifamily	●○○	May be considered appropriate to encourage mixed use development and walkability.
Neighborhood Commercial	●●●	
General Commercial	●○○	May be appropriate when included at arterial intersections within a large, planned development with multi-modal transportation options and site features that mitigate possible negative impacts.
Light or Flex Industrial	○○○	
Heavy Industrial	○○○	
Parks and Open Space	●●●	

DENSITY
N/A
INTENSITY
Low to Medium
SCALE
Low-Rise



Moderate Commercial

Purpose and Character

The Moderate Commercial classification represents a wide variety of goods and services at the regional level. The scale of the commercial development may vary significantly based on the location of the development. Where this classification is located adjacent to existing or proposed residential development, buffering and screening should be in place to reduce the negative impacts on the residential development but should be careful to not create barriers that discourage walkability.

DEVELOPMENT TYPE	APPROPRIATENESS	CONDITIONS
Single-Family Detached Homes	○○○	
Duplex, Triplex, and Quadplex Homes and Townhomes	○○○	
Multifamily	○○○	
Neighborhood Commercial	●●●	
General Commercial	●●●	
Light or Flex Industrial	●○○	May be appropriate when included as a transitional use with high-quality design standards and connected by multi-modal transportation options.
Heavy Industrial	○○○	
Parks and Open Space	●●●	

DENSITY
N/A
INTENSITY
Medium
SCALE
Low to Mid-Rise



Employment Center

Purpose and Character

This land use category includes offices, industrial business parks, and commercial development located along major thoroughfares for easy transportation access. Such uses should be screened and buffered from adjacent residential areas. It may also include manufacturing and storage uses without outdoor operations.

DEVELOPMENT TYPE	APPROPRIATENESS	CONDITIONS
Single-Family Detached Homes	○○○	
Duplex, Triplex, and Quadplex Homes and Townhomes	○○○	
Multifamily	○○○	
Neighborhood Commercial	●●○	Overall appropriate; retail and services such as restaurants, lodging, etc. that cater to the needs of the workers in this area should be encouraged.
General Commercial	●●●	
Light or Flex Industrial	●●●	
Heavy Industrial	○○○	
Parks and Open Space	●●●	

DENSITY
N/A
INTENSITY
Medium
SCALE
Low-Rise



Industrial

Purpose and Character

The Industrial classification includes areas devoted to manufacturing, storage, distribution, business/operations, assembly, and processing. This land use category includes more intense industrial development, which may involve outdoor storage, and activities involving hazardous or noxious material. These areas should be located along major thoroughfares for easy transportation access and be screened and buffered from adjacent residential areas. Office and commercial development may be appropriate within this designation to support industrial development.

DENSITY
N/A
INTENSITY
Medium
SCALE
Low-Rise

DEVELOPMENT TYPE	APPROPRIATENESS	CONDITIONS
Single-Family Detached Homes	○○○	
Duplex, Triplex, and Quadplex Homes and Townhomes	○○○	
Multifamily	○○○	
Neighborhood Commercial	●○○	Overall appropriate; retail and services such as restaurants, lodging, etc. that cater to the needs of the workers in this area should be encouraged.
General Commercial	●●○	May be appropriate when included as a transitional use and connected by multi-modal transportation options.
Light or Flex Industrial	●●●	
Heavy Industrial	●●●	
Parks and Open Space	●●○	In Industrial areas, public open space should be located where easily and safely accessible for the community, and is most appropriately used as a buffer for adjacent uses or environmentally sensitive areas



Public/Institutional

Purpose and Character

The Public/Institutional classification is for uses that serve a public purpose or public entity, such as government buildings, schools, libraries, and utilities.

DEVELOPMENT TYPE	APPROPRIATENESS	CONDITIONS
Single-Family Detached Homes	○○○	
Duplex, Triplex, and Quadplex Homes and Townhomes	○○○	
Multifamily	○○○	
Neighborhood Commercial	●○○	Smaller commercial uses and services that cater to the needs of the workers in the area may be appropriate.
General Commercial	○○○	
Light or Flex Industrial	○○○	
Heavy Industrial	○○○	
Parks and Open Space	●●●	

DENSITY
N/A
INTENSITY
Low to Medium
SCALE
Low to Mid-Rise



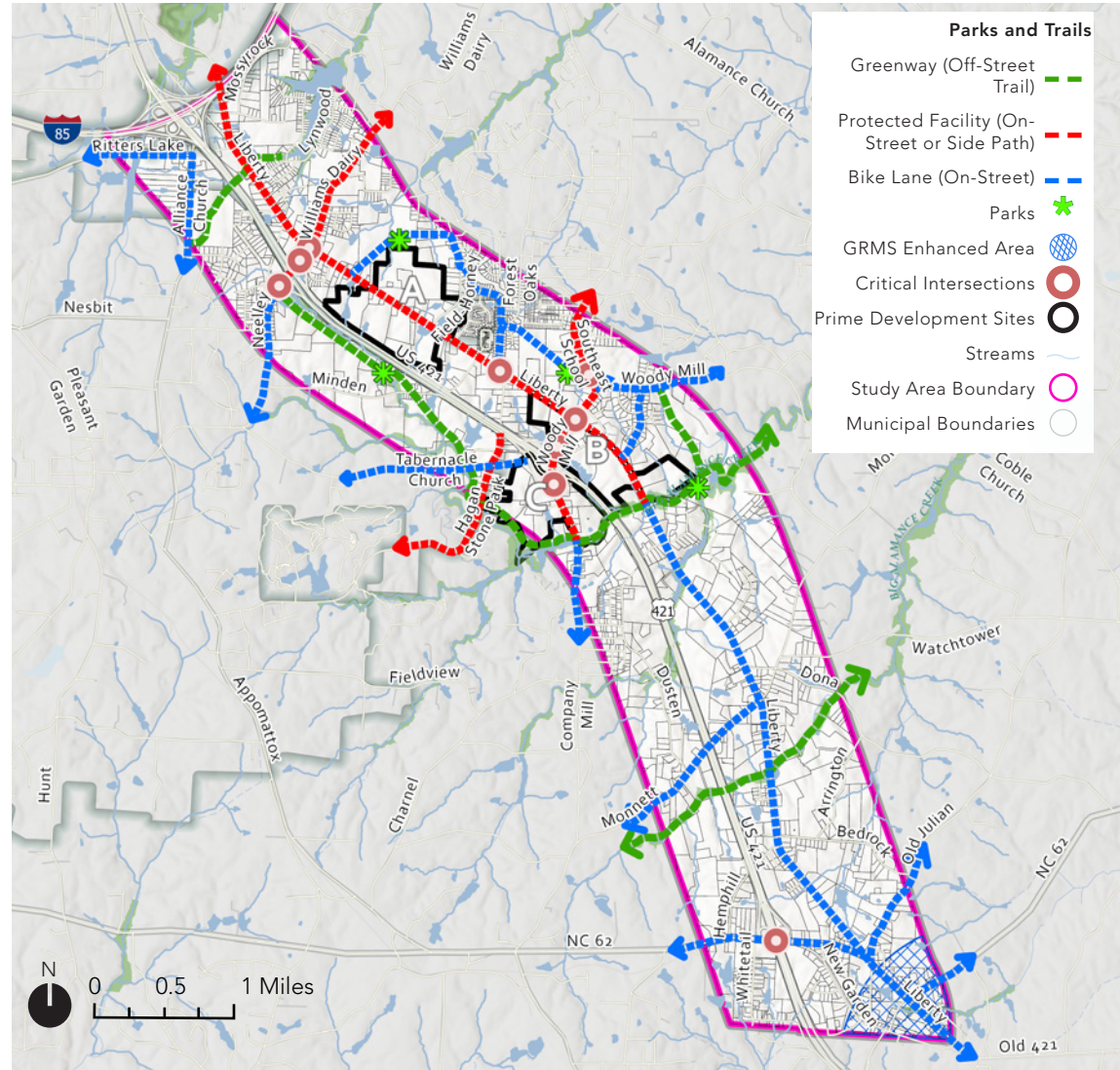
CIRCULATION PLAN

This corridor is designated a Strategic Highway Corridor by the North Carolina Department of Transportation (NCDOT), meaning this is a critical corridor in the state to provide connectivity and move people and freight. Highway 421 is planned to be converted to I-685 between I-85 in Greensboro and I-95 in Dunn. This conversion to interstate designation will require the closure of at-grade intersections in the southern portion of the study area.

Map 15 shows the Proposed Circulation Plan for the study area. The map indicates critical intersections which are locations where it is anticipated that improvements for vehicular, pedestrian, and/or cyclists will be needed. Some of the critical intersections can become interchanges or overpasses in the future as needed.

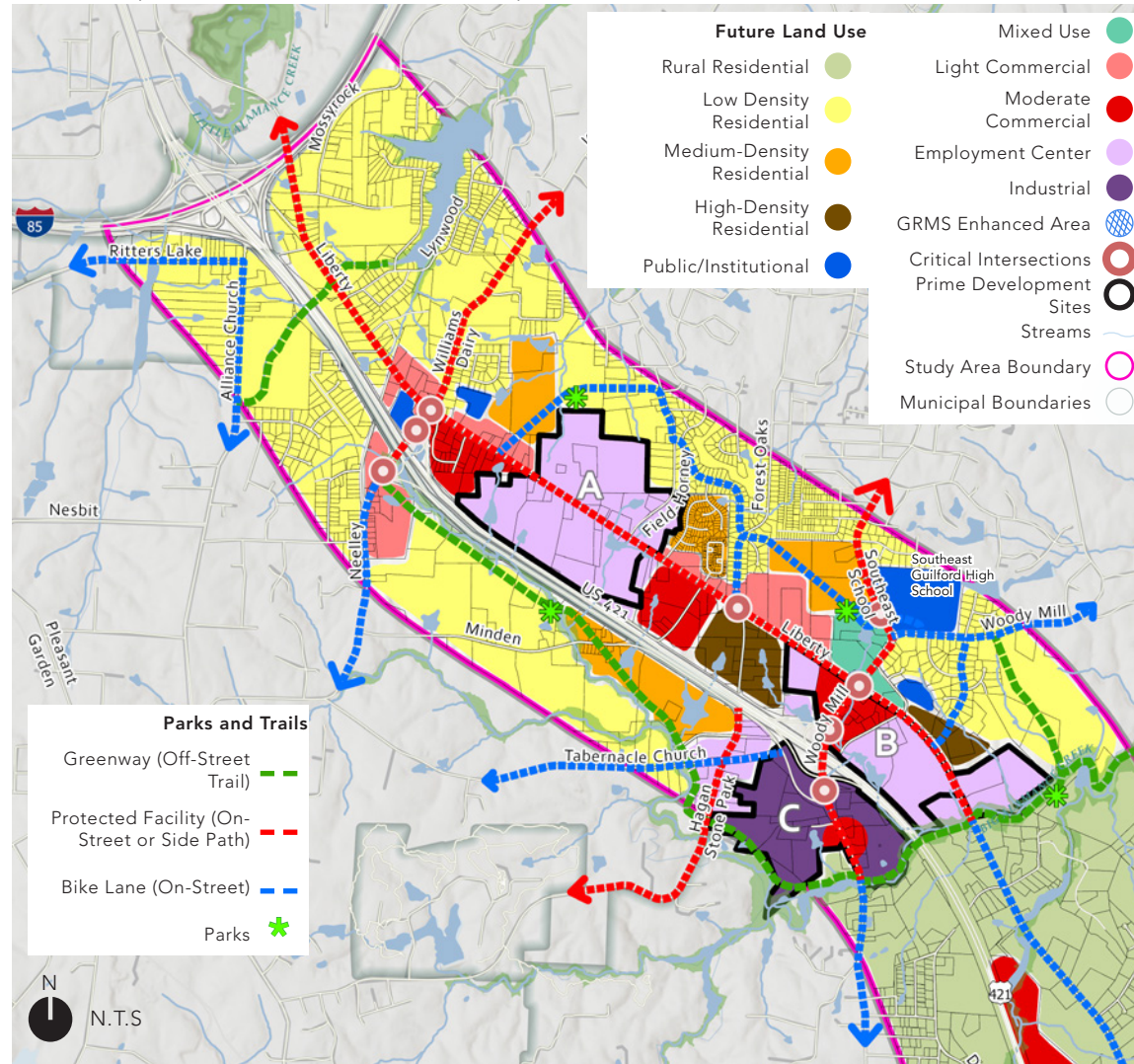
The Plan also identifies recommended locations for parks. These locations are tentative and can be changed based on future development patterns. Parks should also be located in additional locations as and when need arises.

Map 15. Proposed Circulation Plan



With the proposed land uses shown in Prime Development Sites A, B, and C, both the interchange of Highway 421 at Neelley Road/Williams Dairy Road and Highway 421 at Woody Mill Road/Company Mill Road will experience an increase in traffic volumes as these areas are developed. Signalization of the ramp termini at Highway 421 at Neelley Road/Williams Dairy Road and signal upgrades of the ramp termini at Highway 421 at Woody Mill Road/Company Mill Road are likely to be needed as uses in the area intensify. Given the proposed land use changes near Southeast Guilford High School, it is likely the traffic patterns in this area will change, and as those developments are planned and designed, the intersections surrounding the school should be reviewed for any upgrades necessary. Additionally, widening of Liberty Road between Williams Dairy Road and Woody Mill Road is anticipated to be necessary as this area is built out and should be considered in the future as projects are prioritized by the Greensboro Urban Area MPO. On-demand microtransit opportunities should be explored as this area grows. As large employers and higher density residential development occurs, consideration for transit operations should be made including express or commuter service options. Map 16 shows changes to the recommendations to the *Greensboro Urban Area MPO 2015 Bicycle, Pedestrian, and Greenway Master Plan* based on the proposed land uses.

Map 16. Proposed Circulation Plan - Prime Development Sites



The Circulation Plan builds upon the *2018 BiPed Plan Update*, reflecting the planned trails and adding several newly proposed trails to increase circulation throughout

the study area, connect to neighboring communities, and utilize natural creek corridors and other highway crossings.

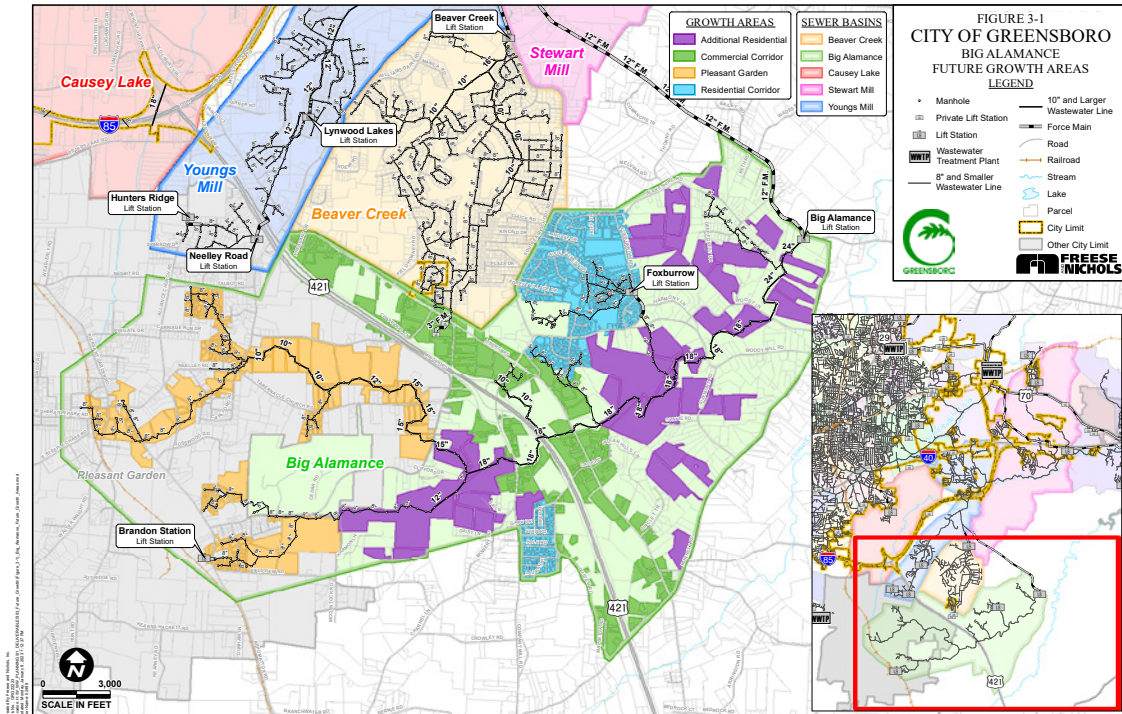
UTILITIES AND SERVICES

In 2023, Freese and Nichols, Inc. conducted a study (Appendix D) of the Big Alamance sewershed to assess existing and future system capacity. The Big Alamance sewershed includes much of the entire study area for this report, in addition to the surrounding area, as shown in Map 17. The sewershed study considers the impacts of the upcoming Toyota facility at the Greensboro Randolph Megasite, as the City's Sandy Creek lift station (currently under construction) will convey flow from the Megasite to the Big Alamance sewershed.

The sewershed study provides recommendations for interim and buildout scenarios. For the interim ("prior to the construction of the buildout improvements"), the study recommends an expansion of the Big Alamance lift station. For buildout, the recommended alternative includes a new lift station and force main.

The sewershed study is based on the assumption that much of the land within the sewershed will develop as commercial uses; however, a detailed land use plan was not conducted. Upon completion of this Highway 421 Corridor Plan, an update to the sewershed study is recommended to reflect the entire study area and the recommended uses.

Map 17. Big Alamance Sewershed Study



RECOMMENDED STRATEGIES

LAND USE

LU.1. Preserve prime development sites for employment-generating development.

The Industrial Site Analysis section of this report identifies prime sites for future development based on several criteria, such as lot size, zoning, infrastructure access, and existing development. The FLUP map recommends that these areas be preserved for employment-generating uses, such as business parks, advanced manufacturing, light and heavy industrial purposes. Ancillary commercial, office and retail uses are also anticipated.

LU.2. Encourage an integrated mix of uses to promote walkability, vibrancy, and economic diversity.

By strategically combining commercial, residential, and recreational elements, the portion of the study area generally located between the Williams Dairy/Neelley Road and Woody Mill/Company Mill Road interchanges can be pedestrian-friendly, encouraging people to walk for recreational and transportation purposes. This integrated approach enhances overall livability and contributes to a diverse and resilient economy. The mix of uses stimulates economic activity by attracting various employers, from local businesses to larger enterprises, creating a robust economic ecosystem. The synergy between different functions fosters a sense of community as people live, work, and socialize in close proximity, resulting in a vibrant and well-connected urban fabric.

LU.3. Support innovation-focused land uses by establishing or strengthening partnerships with local education and training partners.

Establishing partnerships with local higher education institutions, trade schools, and employers creates a collaborative ecosystem that leverages each participant's unique strengths and resources. Higher education institutions can contribute specialized knowledge and research capabilities, trade schools can provide hands-on and practical training, and local employers can offer real-world experience and industry insights. Pooling these resources results in a more comprehensive and effective workforce training program and cultivates an environment of innovation. The cross-pollination of ideas and expertise among academia, vocational training, and industry can lead to the establishment of cutting-edge innovation districts or business parks, with a local workforce that is well-equipped to meet the evolving demands of the job market. Ultimately, such partnerships catalyze economic growth and competitiveness, benefiting the workforce, local employers, and the broader community. A partnership with the Guilford County School District is also encouraged to accommodate participation in the development review process for projects in both the City and County and to contribute to discussions concerning population growth and the resources needed to accommodate new residential development. The role of the school district should be elevated to reflect the level of impact of residential growth within the study area and the time required to plan for new school facilities.

LU.4. Plan for appropriate residential development to support the employment centers.

While the prime development sites are earmarked for uses that generate employment, it is important that the surrounding areas encompass a diverse range of residential options, accommodating the needs of the local workforce. Adjacent to employment centers, it is recommended to incorporate medium- and high-density housing options, strategically placing residences near workplaces. Beyond serving as convenient living spaces for employees, these medium- and high-density housing developments can also function as transition zones, particularly buffering for lower-intensity developments like low-density residential uses. Such a strategy ensures harmonious development, concentrating higher-density housing near employment hubs while preserving the study area periphery for lower-density residential development, maintaining a balanced and efficient land-use pattern.

LU.5. Encourage master planned residential and mixed-use development.

The certainty of master planned developments will ensure there is adequate water and wastewater capacity available to serve new homes and supporting office and commercial activities that complement increased employment along the Highway 421 corridor. Decisions about fire, public safety, schools, refuse collection and other services needed to support new developments should be coordinated early in the entitlement process with all service providers participating in plan review activities. Development patterns should provide access to alternative modes of transportation and connected open spaces. Uses should allow residents opportunities to work, shop and recreate close to their homes. Master planned communities can also provide opportunities to strategically save more existing open space and forested areas, helping to tie into the area's existing rural feel while potentially supporting characteristics like green corridors for bicycle and pedestrian connectivity.

LU.6. Update Utility Extension Policy to support thoughtful, proactive planning utility extensions.

Greensboro's Utility Extension Policy is one of the most effective tools for steering the future of not just the Highway 421 Corridor, but any area. Access to utility services defines what is possible from a development perspective. The policy provides a means to react to development proposals, but can also become a tool of proactive consideration by providing weight to small area plan efforts, such as this one, to inform extension request considerations, capital improvements programs and other policy initiatives. The policy update should likewise specifically consider interlocal agreements as a tool to advocate for desired outcomes advocated in this and similar area plans relevant to other cities and towns in these growth areas.

TRANSPORTATION & CIRCULATION

TC1. Require shared and cross-access for adjacent developments to improve mobility and accessibility.

Shared- and cross-access considerations will be important to support coordinated and integrated development within the study area. Shared access involves the utilization of joint driveways for adjacent uses to reduce the number of entry points, which enhances pedestrian safety and mitigates traffic congestion. Complementing this, cross-access facilitates the seamless movement between two neighboring developments without necessitating a return to a road outside of the immediate development. This proactive approach not only improves overall accessibility but also minimizes the risk of collisions on main roads, creating a safer and more efficient built environment and is supported in the NCDOT Policy on Street and Driveway Access to North Carolina Highways, July 2003.

TC2. Seek transportation project funding.

Collaboration with the MPO on opportunities to fund transportation projects to advancing connectivity, circulation, and accessibility. Ensure that the improvements recommended on Map 15 are reflected on the Greensboro Urban Area MPO's Comprehensive Transportation Plan to increase the eligibility for grants and other funding. Projects in this area should be submitted as part of the NCDOT's Project Prioritization Process and the Strategic Transportation Initiatives (STI) Law through the Greensboro Urban Area MPO. The candidate projects would then go through the prioritization process including qualitative scoring in order to be included in the State Transportation Improvement Program (STIP) which focuses on a 10-year period and re-prioritized on a two-year cycle.

TC3. Continue to plan for safe and connected bicycle facilities, both within the study area and connecting to the larger trail network.

Bicycle connectivity within an area provides numerous benefits: recreational opportunities, cost and potential time savings during commutes, mobility independence for those who are unable or prefer not to drive, reduced roadway congestion for those who drive, improved health due to exercise, and reduced pollution. The *2018 BiPed Plan Update* recommends shoulder facilities to accommodate bike traffic along Liberty and Woody Mill Roads. Given the close proximity to Southeast Guilford Middle School and High School, coupled with the anticipated rise in traffic volume, particularly from trucks, buffered bike lanes or off-street multi-purpose trails should be considered in some portions of the study area. Buffered or off-street bike facilities offer a safer and more adaptable infrastructure, meeting the commuting needs of students and employees, whether for daily travel, errands, or recreational biking.

The circulation map proposes three types of trails:

- Greenway (Off-Street Trail): Multi-purpose bicycle/pedestrian trails separated from the roadway pavement; consistent with the *2019 Plan2Play* parks master plan greenway trails.
- Protected Facility (On-Street or Side Path): Buffered or separated trails on higher-volume roadways
- Bike Lane (On-Street): Sharrows, striped lanes, designated shoulders on lower-volume roadways

Trails are recommended to connect key destination points (e.g., employment centers, retail centers, school, parks) to surrounding existing and future neighborhoods. Additionally, trails are recommended for future extensions along Highway 421 to connect to the greater Greensboro trail network. Utility and existing riparian corridors are frequently utilized for greenway routing, and should be taken advantage of when building a pedestrian transportation network within the Highway 421 corridor. These recommendations should be reflected in the next updated to the MPO's bicycle and pedestrian plan.

TC.4 Identify appropriate locations and standards for enhanced pedestrian crossings.

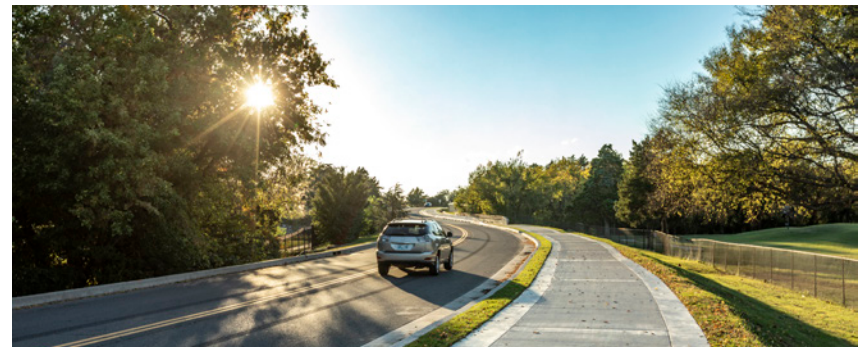
Ensuring the safety of individuals walking to work, school, or other destinations is a key consideration. Optimal locations for these pedestrian connections often encompass areas proximate to schools, retail centers, and employment hubs. Implementing enhanced crossings, such as signalized crosswalks, raised pathways, and traffic-calming features like bulb-outs and roundabouts with improved pedestrian characteristics, can significantly contribute to creating a safer and more pedestrian-friendly environment in response to the anticipated increase in traffic. Several potential crossing locations are indicated on the map as critical intersections; additional study should be conducted to identify future locations as development occurs.

TC.5. Plan for long-term transit or microtransit options, including a potential circulator route to connect key destinations.

As development occurs over time, transit options including express transit route options may be appropriate to connect employment centers, residential areas, and retail destinations – supporting quality of life and reducing traffic congestion. Planning ahead for these options allows for the preservation of necessary right-of-way, infrastructure, and other facilities to support transit options. A circulator could be a regularly scheduled shuttle bus service, and local employers and other institutions may be willing to help fund its operation to improve accessibility to places of employment or retail activity. Also, microtransit opportunities should be explored. Such transit options have the potential to facilitate convenient travel for employees, students, and residents within the study area, offering a viable alternative to car-dependent transportation.

TC.6. Improve infrastructure to support multi-modal transportation choices.

Collaborating with the County and other responsible entities to develop intersections along Liberty Road to support multi-modal transportation choices. The proposed circulation plan (Map 15) includes locations of proposed on-street and off street-trails as well as critical intersections. These locations should be prioritized for implementing improvements. The City should continue to identify potential improvements as developments occurs based on the Future Land Use Plan and collaborate with the County to adopt complete streets design standards.



CORRIDOR ENHANCEMENT, CHARACTER, & OPEN SPACE

CO.1. Develop gateways to announce and frame the corridor.

Create distinctive gateways to mark and define the corridor effectively. Establish gateways along the corridor in proximity to the Guilford/Randolph County line and the I-85 interchange, delineating this particular stretch of the highway as a distinct and memorable locale. These gateways should incorporate cohesive signage, furnishings, and landscaping that are unique to the corridor. Incorporate distinguishing branding elements, as recommended in Strategy CO.7.

CO.2. Coordinate interchange aesthetics with NCDOT.

Existing and future interstate interchanges with intersecting roadways offer opportunities to reflect the unique character of the Highway 421 corridor. Initiating early collaboration with NCDOT facilitates the integration of multi-modal facilities, landscaping, public art, lighting solutions, traffic signals, and furnishings for both upcoming interchanges and existing overpasses requiring retrofitting to align with updated interstate design standards, as the corridor transforms into a segment of the future I-685 interstate.

CO.3. Integrate parks and open spaces throughout the area.

Parks and open spaces play an important role in enhancing the quality of both residential neighborhoods and commercial areas, offering enjoyable natural settings for individuals to relax and rejuvenate. The *2019 Plan2Play* parks master plan recommends the inclusion of neighborhood parks to serve as “community hearts” throughout the Greensboro region. These parks are generally envisioned near high-density, growing areas; on sites five acres or larger, in close proximity to public facilities like schools and libraries, and in environmentally sensitive areas. Based on these factors, the Circulation and Open Space map identifies general locations that may be appropriate for future neighborhood parks. Current greenway planning and design trends show that both utility and riparian corridors are often utilized for greenway routing. These corridors should be taken advantage of when building or expanding the area pedestrian transportation network.

CO.4. Prioritize trees and other landscaping along key corridors.

Maintaining the tree-lined appearance of the Highway 421 corridor is crucial for preserving the area’s distinctive character and creating a buffer against the noise and other influences of the highway for adjacent developments. To maintain this appearance, a 100’ natural buffer should be retained when possible along the frontage of US 421, as recommended by the Liberty Road/Woody Mill Road Vicinity Small Area Plan. A similar aesthetic is desirable along other corridors within the study area, emphasizing trees along thoroughfares to provide shade for pedestrians and cyclists, encourage traffic calming, and preserve the existing natural character. Preserving existing trees whenever possible is desirable to maintain a tree canopy and support environmental sustainability. Other benefits of additional trees and landscaping include screening development, visual calming, retaining existing rural aesthetic, enhancing mental health, and retaining property values.

CO.5. Ensure a high level of building and site design near major corridors and entryways.

High-quality building design, encompassing elements such as appropriate building materials, sloped roofs, thoughtful ornamentation, complementary massing, and compatible heights, should be a priority along major corridors and entryways like Liberty Road and Woody Mill Road. This recommendation seeks to elevate the visual appeal and cohesiveness of these corridors and entryways, ensuring that development contributes positively to the overall aesthetic character of the area. Signage standards should prohibit off-premises signs, require monument signs (rather than pole signs), limit heights for freestanding signs, limit LED reader boards/signs, and encourage coordinated signage within multi-tenant developments.

CO.6. Consider adopting International Dark Sky standards to preserve the night sky.

Dark Sky initiatives aim to reduce light pollution and preserve natural darkness in outdoor environments. Specific practices include full or semi cutoff light fixtures that direct light downward, limiting brightness to the minimum necessary for safety and visibility, using warm-colored lighting that is less disruptive to the natural environment, and time restrictions during certain hours when lighting may not be needed. Such initiatives would preserve the rural atmosphere, promote compatibility between mixed land use types, and lessen the environmental impact of future development.

CO.7. Develop a marketing and identifying brand for the area.

Building upon a recommendation from the *Liberty Road/Woody Mill Road Vicinity Small Area Plan*, conduct a study to identify a more specific identity for the study area to market the area to potential investors and employers. The brand should focus on employment centers with inclusive neighborhoods and shopping centers.

STRATEGY	STRATEGY TYPE	TIMELINE
LAND USE		
LU.1. Preserve prime development sites for employment-generating development.	Policy	Ongoing
LU.2. Support an integrated mix of uses to promote walkability, vibrancy, and economic diversity.	Policy, Future Land Use Map	Ongoing
LU.3. Establish or strengthen partnerships with local higher education institutions, trade schools, and employers to broaden workforce training initiatives, pool resources, and foster innovation.	Partnerships	Mid-term/ Ongoing
LU.4. Plan for appropriate residential development to support the employment centers.	Future Land Use Map	Ongoing
LU.5. Encourage master planned residential and mixed-use development.	Policy, Future Land Use Map	Ongoing
LU.6. Update Utility Extension Policy to support thoughtful, proactive planning utility extensions.	Policy	Short-term
TRANSPORTATION & CIRCULATION		
TC.1. Continue to plan for safe and connected bicycle facilities, both within the study area and connecting to the larger trail network.	Bike/Ped Master Plan, Capital Improvements	Long-term/ Ongoing
TC.2. Identify appropriate locations and standards for enhanced pedestrian crossings.	Study, Capital Improvements	Long-term
TC.3. Require shared and cross-access for adjacent developments to improve mobility and accessibility.	Development Standards	Short-term
TC.4. Plan for long-term transit options, including a potential circulator route to connect key destinations.	Study, Right-of-Way Preservation, Capital Improvements	Long-term
TC.5. Work with regional partners and pursue grant opportunities for transportation projects.	Partnerships	Ongoing
TC.6. Improve infrastructure to support multi-modal transportation choices.	Study, Capital Improvements	Long-term/ Ongoing
CORRIDOR ENHANCEMENT, CHARACTER, & OPEN SPACE		
CO.1. Develop gateways to announce and frame the corridor.	Plan, Land Acquisition, Capital Improvement	Long-term
CO.2. Coordinate interchange aesthetics with NCDOT.	Partnerships	Mid-term
CO.3. Integrate parks and open spaces throughout the area.	Future Land Use Map, Development Standards, Capital Improvement	Ongoing
CO.4. Prioritize trees and other landscaping along key corridors.	Development Standards, General Fund	Mid-term
CO.5. Ensure a high level of building and site design near major corridors and entryways.	Development Standards, Policy	Short-term
CO.6. Consider adopting International Dark Sky standards to preserve the night sky.	Development Standards	Short-term
CO.7. Develop a marketing and identifying brand for the area.	Plan	Mid-term

SHORT-TERM
1-3 years

MID-TERM
3-5 years

LONG-TERM
5+ years

ONGOING
Continual action or policy

3 MARKET OPPORTUNITIES



PRIME DEVELOPMENT SITE A

Example use types:

- Manufacturing and fabrication
- Data center
- Light assembly
- Automotive manufacturing
- Corporate office

Development considerations:

- Utilizing landscaping along both the perimeter and interior corridors can help to maintain a semi-natural character.
- The boundary between the employment center and the neighboring residential areas will be an important consideration. Discouraging the use of screening walls is advised throughout the study area, as they can hinder the connectivity between employment centers and adjacent residential neighborhoods. Rather, it is recommended to incorporate lower intensity uses along the residential boundary and employ landscape buffers to ensure compatibility and preserve access.
- Internal areas can accommodate more intense uses given their non-adjacency to residential areas. However, it is important to limit the amount of truck traffic, considering the restricted access to Highway 421. Alternatively, an interior collector parallel between Highway 421 and Liberty Road could potentially provide access to accommodate truck traffic.



All photos used in this chapter are property of Freese and Nichols, Inc.

PRIME DEVELOPMENT SITE B

Example use types:

- Restaurants, retail shops, hotel, grocery, gas station along the Woody Mill frontage
- Medical
- Corporate office
- Data center

Development considerations:

- Liberty Road and Woody Mill Road are expected to experience significant traffic volumes, amplified by the proximity of the high school and middle school. This heightened traffic presents an opportunity for robust retail activity.
- The recommended uses are consistent with the *Liberty Road/Woody Mill Road Vicinity Small Area Plan*: commercial (retail and services), office/employment, institutional, and residential.
- Industrial uses may be appropriate in the southeastern portion of Area B if an internal road is constructed to provide more direct access to the highway.



PRIME DEVELOPMENT SITE C

Example use types:

- Distribution, logistics, and warehousing
- Outside storage
- Manufacturing and fabrication

Development considerations:

- This area is most compatible with heavier industrial uses given its highway access and limited residential adjacent areas.
- This area is also relatively large, allowing for master planning efforts to coordinate internal circulation and operations.
- A truck stop/travel plaza would complement substantial truck traffic.



MARKET OPPORTUNITIES

SHORT-TERM (0-3 YEARS)

Leverage mega-site impact

Primary employment generators

Focus on economic development projects that offer spill-over effects benefitting Greensboro and the larger region.

- High priority locations within the corridor are those identified through the site selection model and stakeholder input as most suitable for employment center and industrial development
- Guilford County should consider a voluntary rezoning program to allow owners of property within the corridor to rezone according to the future land use map with reduced barriers (e.g., reimbursed application fee waivers, simplified application process) and support through the legislative process. This program will support alignment of future development in the Highway 421 corridor with with this Study and economic development goals for the region.
- Greensboro Water Resources should evaluate and maintain a rate structure for water and sewer services that adequately addresses the full cost of service and long-term maintenance of facilities in this service area since additional resources may not be available.

MID-TERM (3-5 YEARS)

Key industries identified by the Guilford County Economic Development Alliance

Master-planned mixed-use developments

- Work with the Greensboro Chamber of Commerce, the Guilford County Economic Development Alliance and other economic development partners to administer incentive programs focused on the high priority employment centers and industrial properties identified in this study.
- After water and wastewater capacity has been identified and earmarked for employment center and industrial development as indicated on the future land use map, consider approving large, master-planned developments. These projects should identify immediate and long-term infrastructure capacity requirements and needed improvements and be of sufficient size to support development applications. There is also a need to establish a process to formally estimate and assign capacity in order to identify residual available for other uses.
- Identify property suitable for parks and open space, trails, schools, fire stations, and other municipal services within the study area to serve the growing population. Establish regulations that require the dedication of easements or parcels based on the impact caused by new development.

LONG-TERM (5-10 YEARS)

Continued growth through annexation

Single use non-residential sites

Mixed-density residential

- While properties remain outside the Greensboro City limits, a study should be conducted to identify appropriate locations for future fire stations to ensure that the same level of service can be provided to all parts of Greensboro as annexations are considered. This should inform capital improvements planning to coincide with anticipated annexation. Any annexation action must be conducted in accordance with state statutes and will require that municipal services are extended to the newly annexed area within a timeline specified by an annexation agreement or by state statute.
- Annex property in an orderly manner consistent with adopted annexation and utility extension policies. Avoid leapfrog annexation that leaves gaps in municipal boundaries making efficient provision of services difficult. Wherever possible annexation should provide a reasonable connection to the current City limits.
- As utilities and municipal services are brought closer to the corridor through strategic annexation, consider supporting mixed density residential development that will shorten commute times to jobs at the mega-site and within the Highway 421 corridor.
- Invest in quality-of-life amenities such as parks, trails, open spaces, public art, and landscaping to develop an urban design approach and unique identity for the corridor enhancing the marketability and attractiveness of this gateway to Greensboro.

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