SOUTHEASTERN INFRASTRUCTURE STUDY

DECEMBER 2024

GOOCHLAND COUNTY
EST. 1727
VIRGINIA

TIMMONS GROUP

SOUTHEASTERN INFRASTRUCTURE STUDY

prepared for

Goochland County, Department of Community Development

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I. EXECUTIVE SUMMARY

The goal of the Southeastern Infrastructure Study (SIS) is to provide an empirical, data-driven foundation to guide future decision-making relating to the County's infrastructure priorities, infrastructure funding, and future zoning and land use.

The SIS area is within the County Designated Growth Area and was designated the area for future analysis in the County Major Thoroughfare Plan (MTP). This study analyzes existing infrastructure capacities including roadways, public water/sewer, public schools, fire and rescue facilities.

The study creates high-level build out development scenarios (comprehensive plan, mixed-use, and economic development) and calculates the impacts of each to the selected infrastructure. As a result of the SIS study, the following recommendations are offered:

Land Use

- The County should consider undertaking a Comprehensive Plan update for the area to identify the land uses most desirable and beneficial for the County.
- The County should consider undertaking a high-level analysis of the differentiated and unanticipated consequences that uses may create for County infrastructure and services. During the SIS study, it was noted that age-restricted communities have a notable impact on demand for Fire-Rescue services. This type of impact is outside of typical land use analysis. A deeper understanding of these impacts would provide for higher quality land use and facilities planning.
- Any development within the SIS area should be reviewed at a high level to analyze if the impacts are in line with expected impacts.
- The County should consider employing a SIS-type analysis when it embarks on other land use studies.
- Results for the Comprehensive Plan Scenario should be used on departmental master plan updates for SIS area until such time as the Land Use Plan is updated by the Board of Supervisors.

Transportation

- The County should plan for an additional 2 to 8 travel lanes within the study area through an update to the Major Thoroughfare Plan (MTP).
- New roadways (planned and constructed) should provide interconnectivity to all parcels and land-bays within the study area.
- The MTP update should build upon principles established in the current MTP such as limiting Hockett Road to two lanes with safety and intersection improvements.
- The intersection of Patterson Avenue and River Road has an existing crash history and should be evaluated for safety improvement.

Water and Sewer

- Water and sewer lines will need to be extended to parcels comprising the land bays. The County should evaluate the feasibility of extending the utility lines.

Schools

- The County should begin to plan for 3-14 new classrooms.
- While enrollment at Randolph Elementary School dropped after a redistricting in the 2024-25 SY and is currently within capacity, two of the scenarios (Mixed Use, Economic Development) would push it beyond capacity. If these scenarios are realized, the County should begin planning for a replacement to the school.
- Additional classrooms will also require teachers, service personnel, and supplies.

Fire and Rescue

- The new West Creek Fire-Rescue station planned for the area will be needed and a location/design should be planned for in the immediate future.
- Should the mixed-use scenario be developed, additional capacity may be needed.
- The additional fire and rescue facilities will also require full-time emergency personnel, equipment, and supplies.

Capital Facilities Planning

- Review capital facilities plan to make sure development standards are keeping pace with agency requirements, such as the Fire Department Master Plan.
- Study other capital facility needs for this area, such as a County Park or remote Sheriff facilities.

II. STUDY OVERVIEW

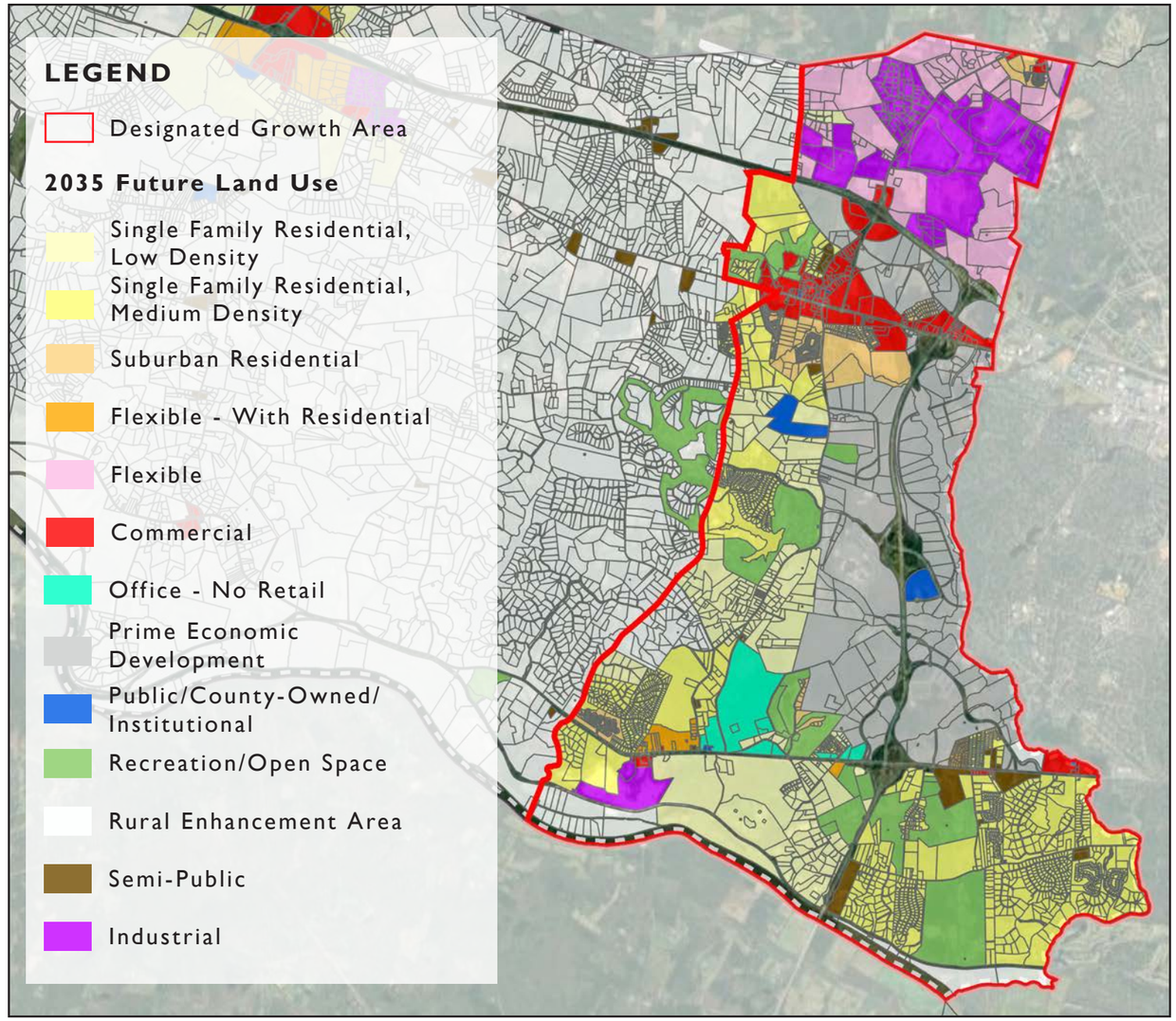
Location and Context

Goochland's 2035 Comprehensive Plan (adopted in 2015) lays out a future land use vision that includes distinct growth areas and retention of significant rural areas. As Central Virgina and the Richmond Region continue to grow, Goochland County has an established strategic goal of "balanced development that contributes to the welfare of the community and preserves its rural character." The plan directs future development to Designated Growth Areas (DGAs). The advantages of delineating these areas include the following:

- Proactively planning and coordinating growth
- Reducing pressure to develop in rural areas
- Supporting cost effectiveness in utilizing existing and planned infrastructure
- Facilitating private sector investment in infrastructure

The SIS Study Area is within a DGA and is generally bounded by Tuckahoe Creek Parkway to the north, the James River to the south, the Goochland County Line to the east, and Hockett Road to the west. The SIS area has seen a significant amount of development over the past number of years.

During review and consideration of the County-wide 2040 Major Thoroughfare Plan (MTP) (approved in 2018), concerns were raised about future roadways identified in the previous MTP (2005) and providing future interconnectivity between roadways such as Route 288, Patterson Avenue, Hockett Road, Broad Branch Drive, and River Road.

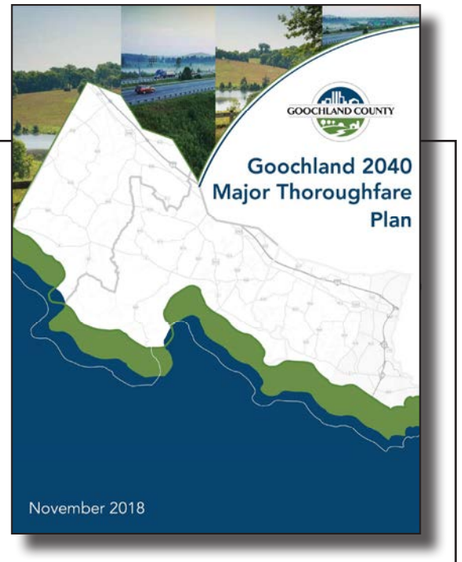


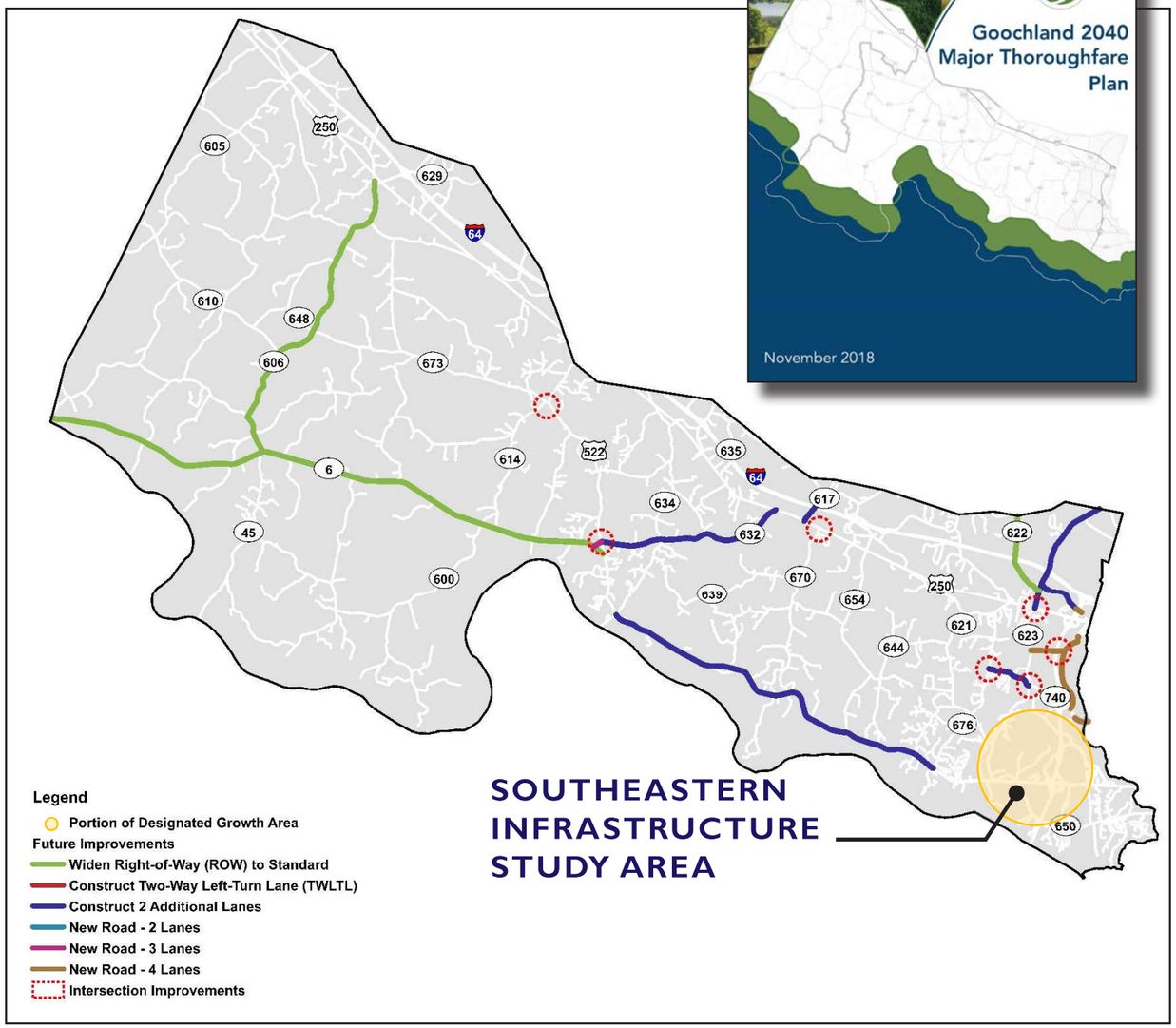
LOCATION AND CONTEXT

During the consideration of the Major Thoroughfare Plan (MTP), it was learned that future land use development envisioned by a number of property owners within the study area was not consistent with the County's comprehensive plan. The County decided that addressing these multifaceted and important topics was beyond the scope of the County-wide MTP update effort, and the area was designated in the 2018 MTP for future study as shown in a circle on the MTP. It is now the subject of this study.

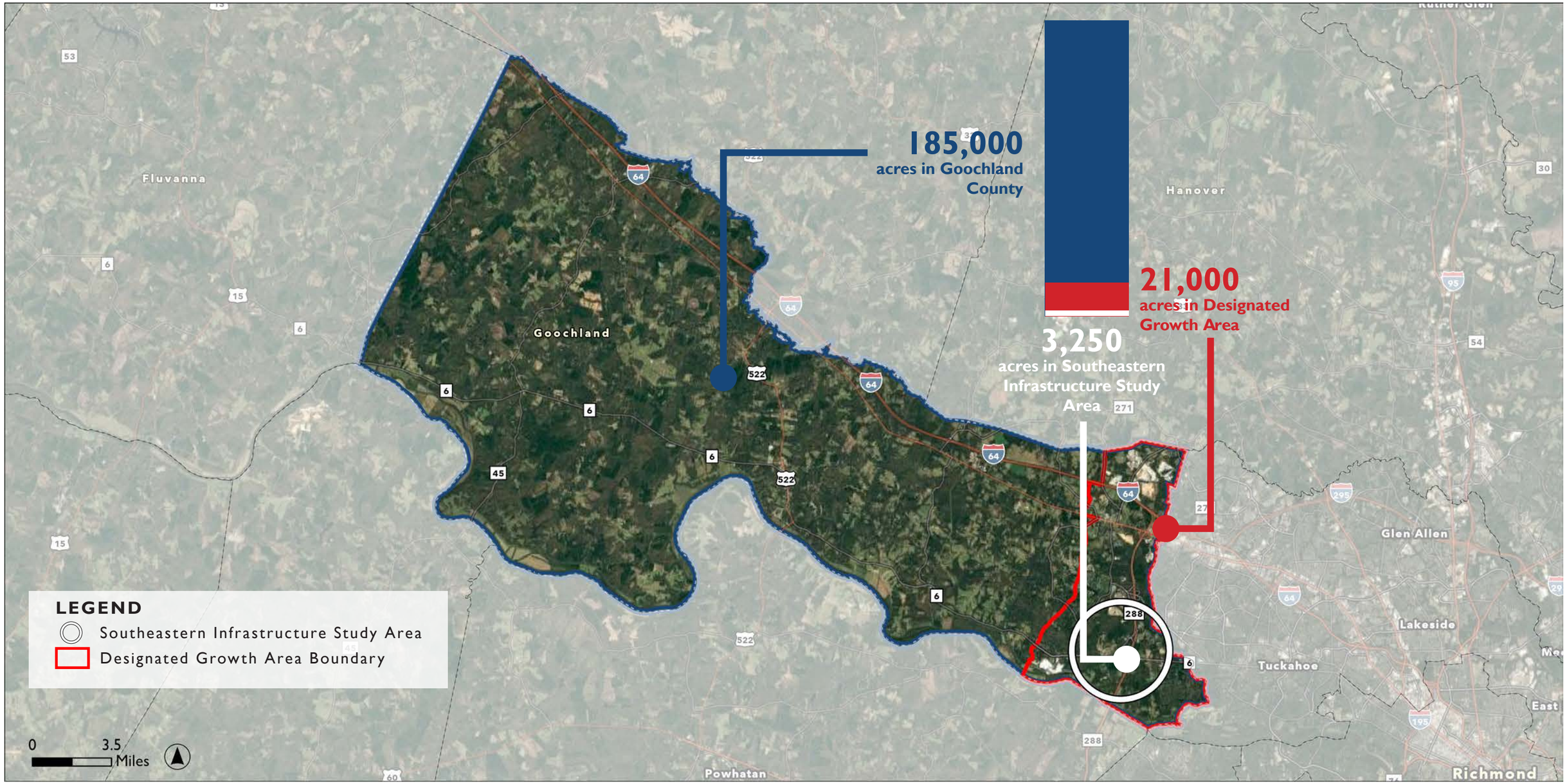
Goochland County covers 185,000 acres with 21,000 acres (or 11%) designated for growth withing the DGAs. The Southeastern Infrastructure Study (SIS) area contains approximately 3,250 acres (or 15%) out of the 21,000 total acres in the easternmost DGA.

The SIS study area contains some development (West Creek, Mosaic, Creekmore, Collegiate facilities, and Benedictine College Preparatory School) but overall is primarily undeveloped or minimally developed.





STUDY AREA

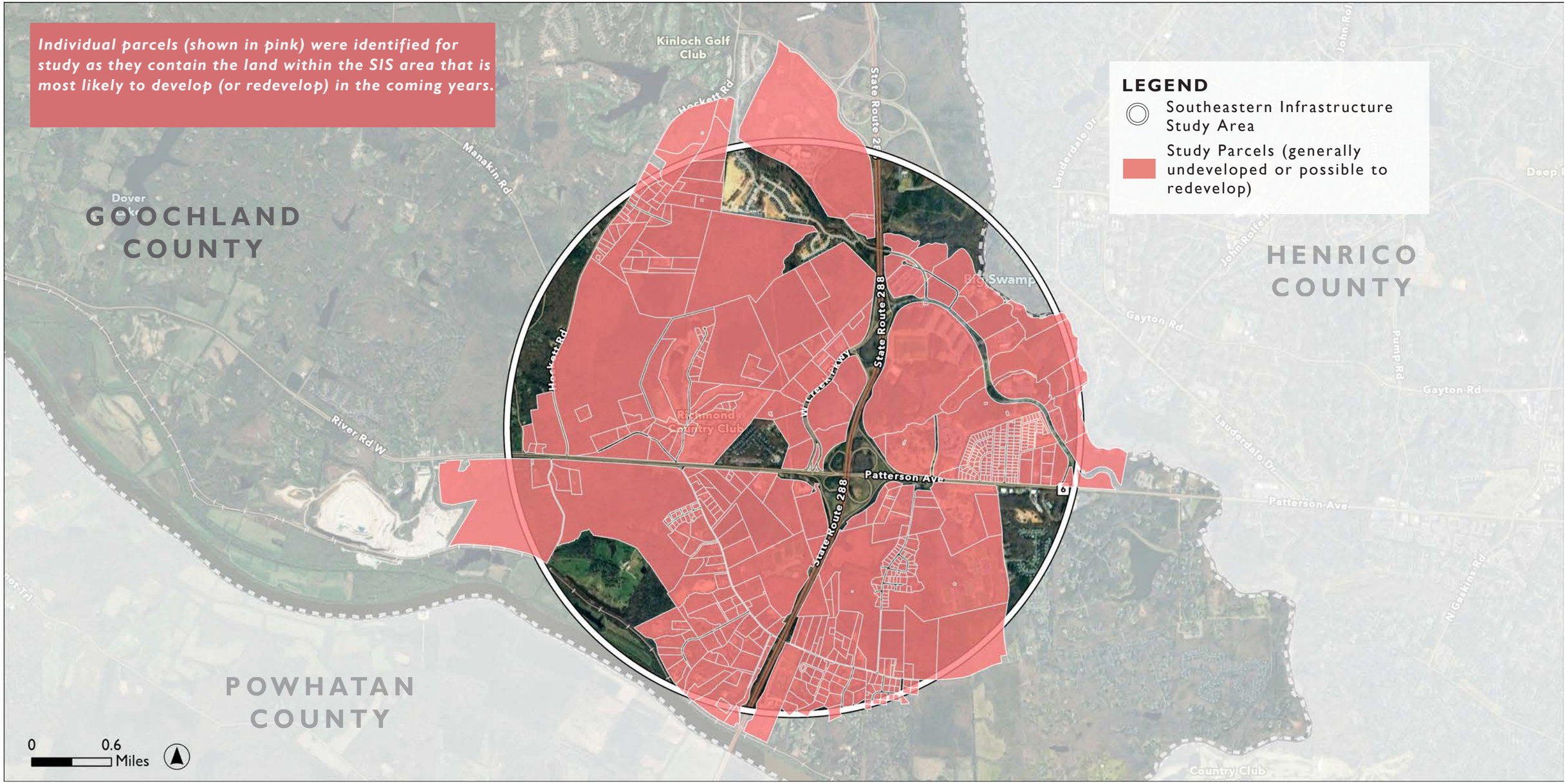

185,000
acres in Goochland County
21,000
acres in Designated Growth Area
3,250
acres in Southeastern Infrastructure Study Area
LEGEND
Southeastern Infrastructure Study Area
Designated Growth Area Boundary
0
3.5
Miles
Fluvanna
Goochland
Hanover
Glen Allen
Lakeside
Tuckahoe
East
Richmond
Powhatan

STUDY AREA


LEGEND
Southeastern Infrastructure Study Area
GOOCHLAND COUNTY
HENRICO COUNTY
POWHATAN COUNTY
Manakin Rd
River Rd W
River Rd W
Hockett Rd
State Route 288
W Creek Pkwy
Richmond Country Club
Big Swamp
Tuckahoe Creek Park
Gayton Rd
Pump Rd
Lauderdale Dr
Patterson Ave
Patterson Ave
6
6
288
288
0
0.5
Miles

STUDY AREA

Individual parcels (shown in pink) were identified for study as they contain the land within the SIS area that is most likely to develop (or redevelop) in the coming years.



PURPOSE AND SCOPE

What are the goals of this study?

The goal of the Southeastern Infrastructure Study is to provide an empirical, data-driven foundation to guide future decision-making relating to the County's:

- Infrastructure priorities
- Infrastructure funding
- Future zoning and land use

The study:

1. Analyzes existing infrastructure capacities:
    a. Roadways
    b. Public Water/Public Sewer
    c. Public Schools
    d. Fire-Rescue
2. Analyzes a limited number of planned capital improvements; and
3. Creates high-level build out development scenarios and calculates their impacts to the selected infrastructure.

The study supports future planning efforts by:

- Analyzing existing capacity of the infrastructure:
    - What infrastructure improvements are needed today?
- Analyzing future conditions with Comprehensive Plan recommended growth:
    - What infrastructure improvements are needed to support the planned growth?
- Analyzing infrastructure needs (and comparing) for:
    - An economic development center future for the area,
    - A mixed-use development future for the area.
- Establishing performance metrics (grades) for the infrastructure:
    - Prioritize maintaining existing service levels.
- Providing the Board of Supervisors detailed information about infrastructure to guide future planning decisions in the area
    - Provide planning level costs estimates for all identified improvements
- Additionally, the study provides an estimate of the revenue generated by each development scenario.

To facilitate the goals of this study, the study team developed a Development Impact Estimator Tool that will allow the County to adjust to the ever changing nature of development and continue to provide up to date information to the County and the Board of Supervisors.

The SIS study:

- Is not a land use plan or small area plan
- Does not promote higher density than called for in the Comprehensive Plan
- Does not recommend changing the zoning of parcels
- Will support the County in goals related to:
    - Targeting appropriate development within the Designated Growth Areas
    - Preserving Rural Enhancement Areas recognized in the Comprehensive Plan

STUDY STRUCTURE

The study team was comprised of County Staff and a Consultant Team (Timmons Group and 3TP Ventures). A Technical Committee periodically provided additional guidance and advice to the Study Team.

The Study Team generally met bi-weekly and the Steering Committee monthly for the duration of the project.

Steering Committee

Charlie Vaughters, Board of Supervisors, District 4

Jonathan Lyle, Board of Supervisors, District 5

Curt Pituck, Planning Commission, District 4

Tom Rockecharlie, Planning Commission, District 5 (Term end 2023)

Dwain Cosby, Planning Commission, District 5 (Term began 2024)

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Josh Gillespie, Deputy County Administrator

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Dr. Michael Cromartie, School Superintendent

Debbie White, School Chief Finance Officer/Capital Projects Manager

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Consultant Team

Paul Trapp, Timmons Group Principal

Steve Schmidt, Timmons Group Project Manager

Mike Callahan, 3TP Ventures President

Jeremy Goldstein, 3TP Ventures Market Analyst

Emily Routman, Timmons Group

STUDY TIMELINE

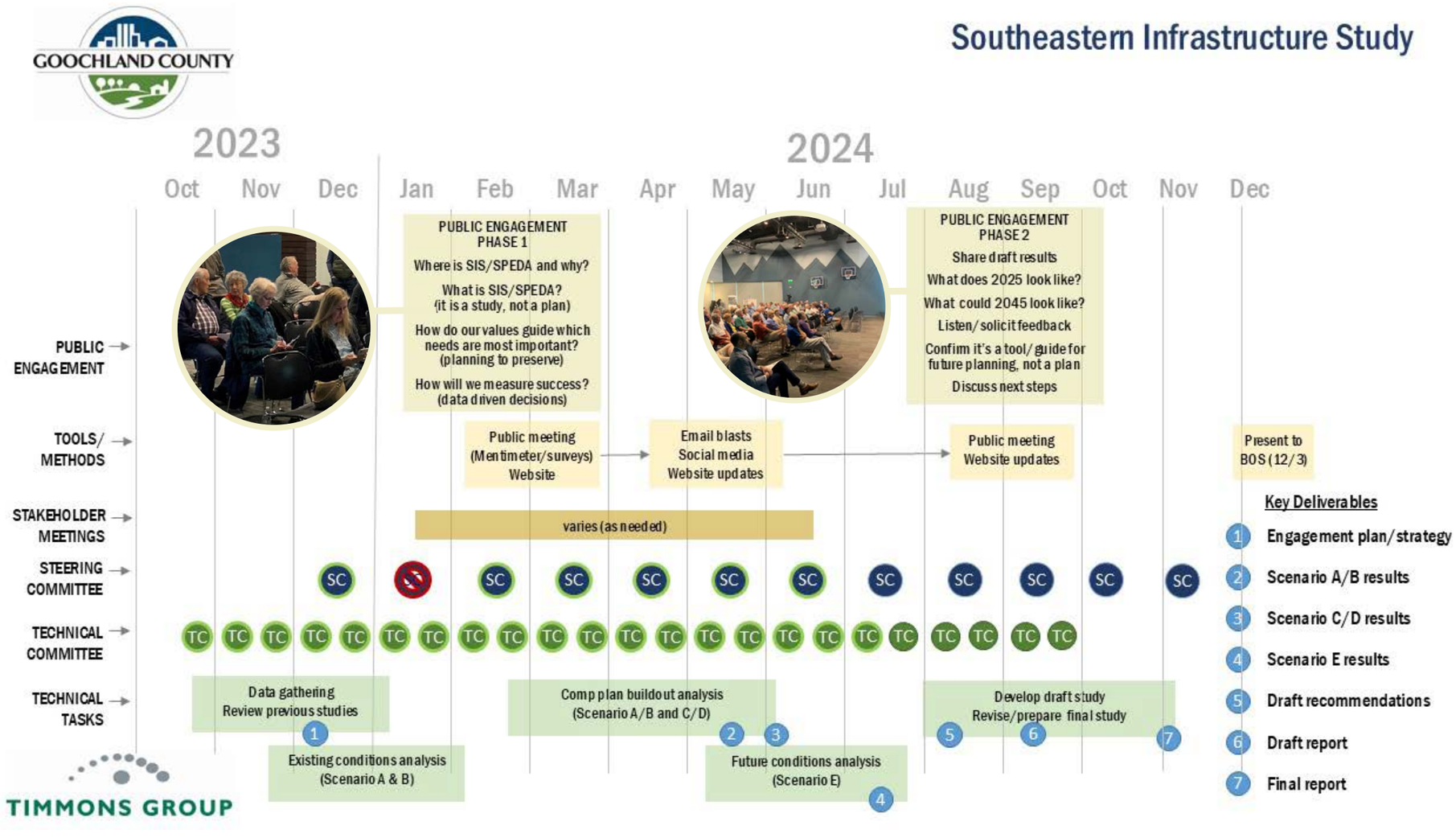
The study began in October 2023 with a site visit and background research from the study team. The initial Technical Committee meeting was held in November 2023 and the initial Steering Committee meeting in December 2023.

The study team then met with key stakeholders in the study area in December 2023/January 2024 and held an initial Citizen Information Meeting with all Goochland Citizens in March 2024.

The consultants continued working on the project through the summer of 2024, holding follow-up meetings and work sessions. A second citizen meeting was held in September 2024 to present the results of the study and the Development Impacts Estimator Tool.

The results of the study were presented to the public, followed by a question and answer period and an open house. The attendance numbers and questions asked at each meeting are included in the Appendix.

The final report and findings were presented to the Goochland County Board of Supervisors in December 2024.



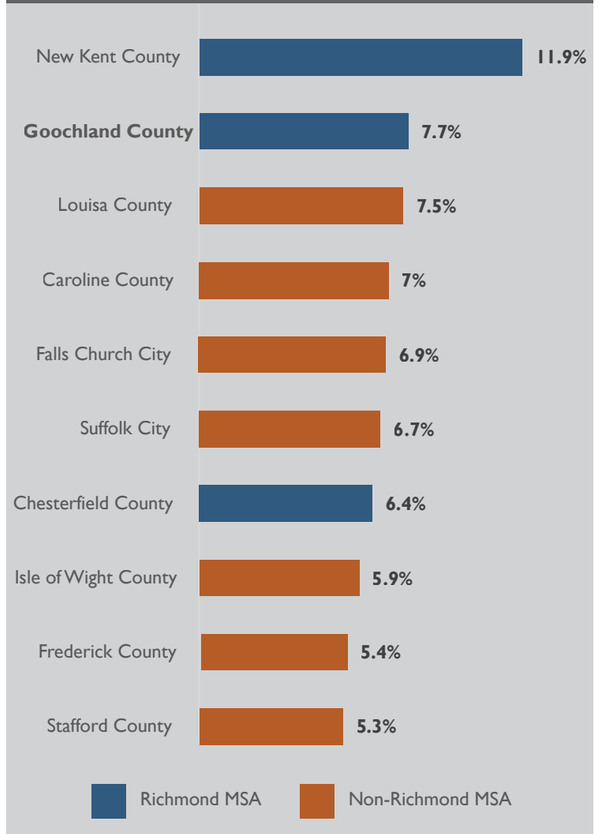
LAND USE SCENARIOS

What is the future of land use in Goochland?

Goochland was Virginia's second fastest-growing County between 2020 and 2023 according to the Weldon Cooper Center's estimates. The County's recent community engagement has highlighted growing concern among residents about how growth may affect County infrastructure and services. With growth comes increased demand for schools, fire and rescue, roads, and many other public services and infrastructure.

Goochland County worked to create a means to analyze infrastructure capacity impacts from future development. The result of this effort is a tool – the Development Impacts Estimator Tool – that better informs decision-making in the SIS area.

POPULATION GROWTH BY VIRGINIA LOCALITY, 2020-2023



Source: Weldon Cooper Center

As future development is inherently uncertain, the County's staff worked with its consulting team (the project team) to collaboratively develop a method for an interactive spreadsheet-based evaluation tool. The user inputs distinct land use mixes and intensities, and the tool exports expected capacity impacts on the following key issues for County decision-makers:

- Commercial development
- Housing
- Fire & Rescue
- Schools
- Roads
- Water
- Sewer
- Tax Revenue

The Development Impacts Estimator Tool can analyze different development scenarios for both the Southeastern Infrastructure Study and future planning efforts in the study area. The methods and functionality of the tool are described below.

LAND USE TRENDS IN 2024

Post-COVID impacts continue to impact market conditions

Influx of **people are moving** from Northern Virginia and Washington DC to the Richmond region

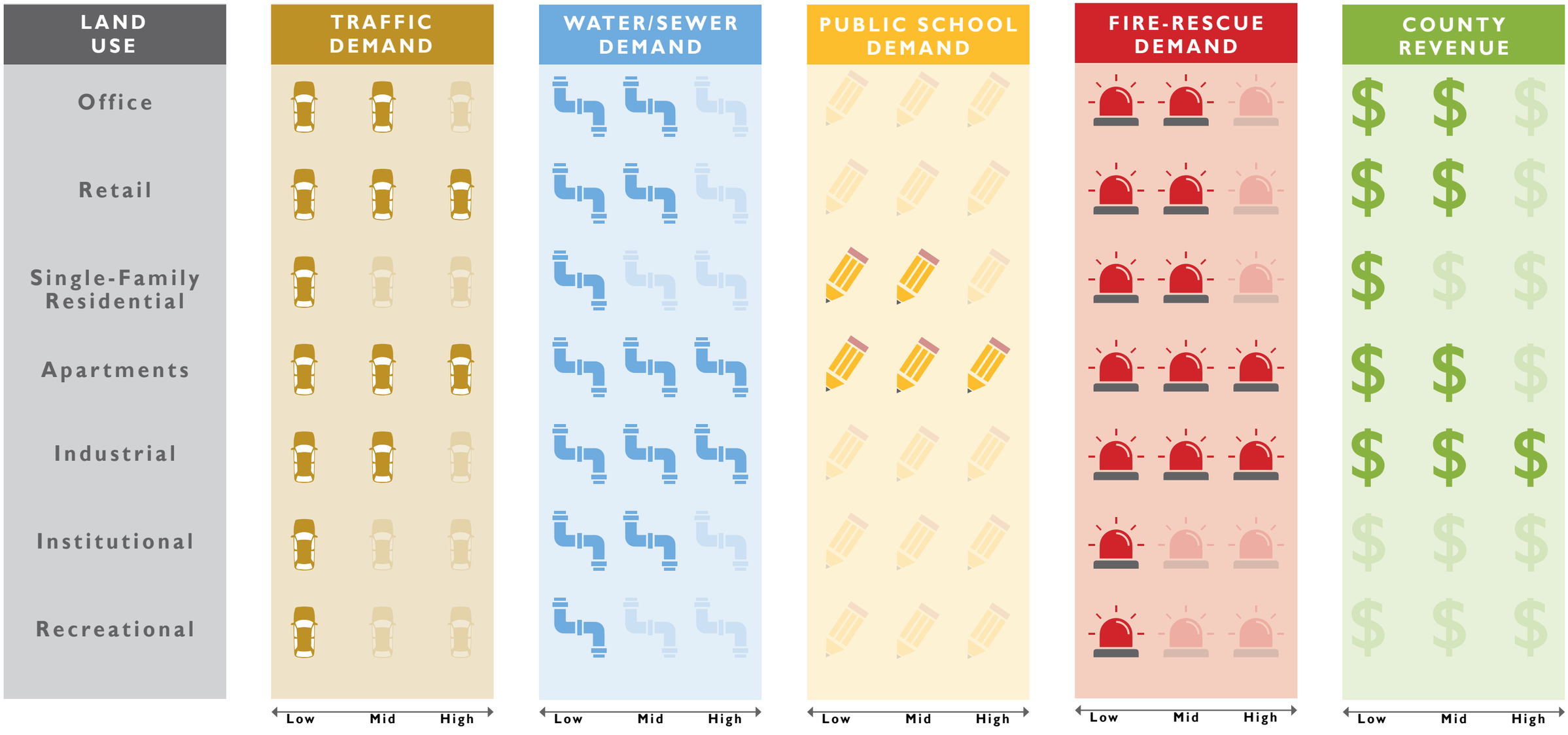
More people are **working remotely**, so there is much less demand for new general office space

Increased reliance on technology is creating demand for large **data centers**

High **interest rates and construction costs** are limiting construction projects in all sectors, exacerbating regional housing shortage

LAND USE SCENARIOS

What are the infrastructure needs for different land uses in Goochland today?

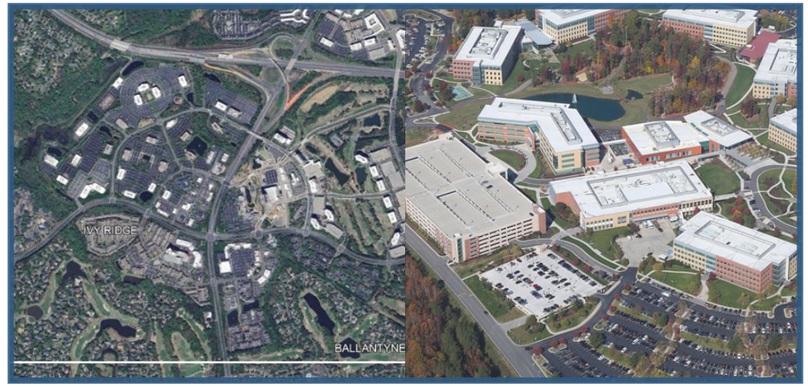


LAND USE SCENARIOS

Which scenarios were evaluated?

Scenario analysis is one way that planners and decision-makers wrestle with the inherent uncertainty of future development. Scenarios make assumptions about the future to understand how distinctly different outcomes would affect what matters to the County.

In this case, the scenario inputs are different land use mixes (such as commercial, residential, and industrial) and land use intensities for future development. Through a combination of market analysis, input from stakeholders, and discussions with the Technical and Steering Committee members, the project team determined land use mixes for three future development scenarios to understand their implications on infrastructure. The scenarios assessed by Goochland County were:



*A **Comprehensive Plan-based** scenario, which serves as a sort of "trends extended" scenario, effectively extending existing development patterns for future land use.*

*A **Mixed Use-leaning** scenario, which combines general commercial development with more housing and retail to create a future development pattern amenable to living, working, and congregating in the area.*

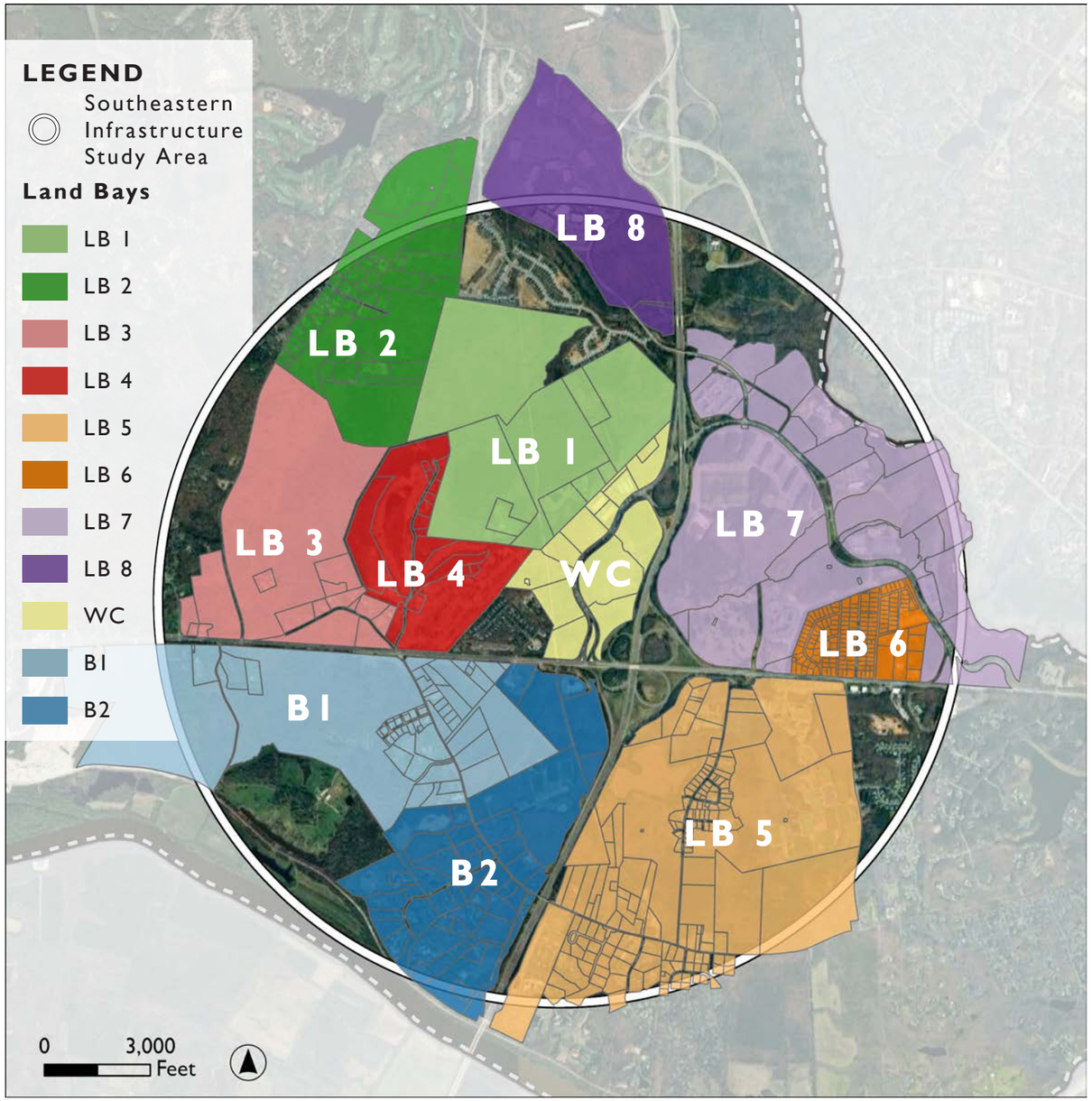
*An **Economic Development-leaning** scenario, which assigns more land to commercial uses and value-added industrial consistent with Goochland policy and market trends.*

LAND BAYS

The project team and Steering Committee were careful to ensure that this study avoids making future development assumptions about individual parcels of land. As such, the project team developed the concept of 'land bays.' Land bays are groups of multiple parcels that have similar characteristics, such as road access, ownership, close proximity, or other constraints. The study area was thus broken into 11 land bays.

Future growth assumptions for the SIS area are apportioned by land bay. Each land bay is broken down by the percent of future land assigned to each specific land use. For example, a land bay could be forecasted as 20 percent flex office/warehouse, 25 percent single family residential, 10 percent medical, etc., while another land bay could be forecasted as a completely different mix. These percentages are converted into acreage estimates for each land use based on the total amount of undeveloped land in the land bay. In this way, future growth could be accommodated without assigning land uses to specific parcels.

Of note, the Comprehensive Plan scenario developed in the tool does not use these land bays; instead, it uses the boundaries of the Future Land Use designations in the Comprehensive Plan. But any future scenarios not included in this original analysis are encouraged to use the land bay concept. It is also important to note that future development is assigned only to parcels that are undeveloped in 2024. However, the Future Land Use designations typically aggregate a number of parcels, thereby facilitating a comparable analysis.



LAND BAYS

Land Bay ID	Acres	Parcels	Distance from Fire-Rescue?	Connection to Major Roads?	Water Main Available?	Sewer Main Available?
LB 1	502.81	9	3-5 miles	No	Yes	Yes
LB 2	148.35	10	5 miles	Yes	Yes	Yes
LB 3	454.17	20	< 1 mile - 5 miles	Yes	No	No
LB 4	227.59	10	< 1 mile - 5 miles	Yes	Yes	Yes
LB 5	65.04	7	3-5 miles	Yes	Yes	No
LB 6	60.20	81	3-5 miles	Yes	Yes	Yes
LB 7	670.23	33	3-5 miles	Yes	Yes	Yes
LB 8	297.00	5	5 miles	Yes	Yes	Yes
WC	168.93	12	3-5 miles	Yes	Yes	Yes
B1	568.51	23	< 1 mile - 3 miles	Yes	No	No
B2	72.58	4	1-3 miles	Yes	Yes	No

LAND BAYS

Land Use Types and Intensities

Development Impacts Estimator Tool

The Development Impacts Estimator Tool employed different land uses as inputs, which are listed below:

- **Advanced Manufacturing:** Facilities focused on using innovative technologies and automated processes to produce high-tech products, often in industries like aerospace, electronics, or biotechnology.
- **Data Center:** A specialized facility designed to house servers and IT infrastructure, providing data storage, processing, and networking services.
- **Distribution:** Facilities used for the storage, handling, and distribution of goods, typically involving warehouses and logistics operations.
- **Medical:** Land used for healthcare services, including hospitals, clinics, medical offices, and other healthcare facilities.
- **Flex Office/Warehouse:** A versatile building type combining office and warehouse space, often used for light industrial, storage, or business purposes.
- **Suburban Office Park:** A collection of office buildings located in suburban areas, typically with extensive parking and landscaped surroundings.
- **Retail:** Commercial space dedicated to selling goods and services directly to consumers, such as shops, malls, and shopping centers.
- **Residential - Well & Septic:** Housing developments in rural or less densely populated areas where water and wastewater management is provided by private wells and septic systems rather than municipal utilities.
- **Residential - Utilities:** Residential areas connected to public water and sewer systems, typically found in more urbanized settings.
- **Multifamily:** Residential buildings designed to house multiple families, such as apartment complexes or condominiums.
- **Recreation/Open:** Land reserved for recreational use or preservation, such as parks, sports fields, and nature reserves.

This list is meant to reflect the most likely types of future development in the SIS area, as determined by conversations with County staff, officials, and the project team. This list can be adjusted or enhanced by users as needed.

Comprehensive Plan

For the Comprehensive Plan scenario, the following land uses were assumed in the study area in the future. These land uses are described in the County's Comprehensive Plan:

- **Prime Economic Development:** Strategic locations in the county relative to superior transportation networks and utility infrastructure. Land uses should demonstrate a positive impact on the County's tax base and may include uses that serve to attract and retain corporate investment, generate jobs, and expand and diversify the County's tax base.
- **Recreation/Open Space:** Public and private areas planned for passive and active recreation and open space uses such as athletic fields, golf courses, and properties encumbered with Conservation Easements.
- **Rural Enhancement Area:** Exhibit a rural character with low density residential, agricultural, forest, or other uses which are not planned for public or central utilities.
- **Single Family Residential, Low Density:** Single family residential uses with an average lot size of 2 acres.
- **Single Family Residential, Medium Density:** Single family residential uses with an average lot size of 1 acre.
- **Suburban Residential:** Single family residential uses with a maximum density of 2.5 units per acre.
- **Flexible - With Residential:** A combination of land uses such as residential, retail service, and office uses should be considered.

LAND BAYS

Land Bay LB 1

Land Bay LB 1 is generally bounded by State Route 288 to the east, Mosaic West Creek to the north, and Richmond Country Club to the south. It currently has no connectivity to the County's major roadway network and very limited internal roadway connectivity and is generally undeveloped. It has 9 parcels and 502.8 acres.

Existing Conditions Metric	LB 1
Distance to Fire-Rescue	3-5 miles
Water Main Available	Yes
Sewer Main Available	Yes
Connections to Major Roads	None

What are the land use assumptions for LB 1 in each scenario?

Current Zoning

Agricultural Limited (A2): 98.4%

Residential Planned (RPUD): 1.3%

Industrial Limited (M1): 0.4%

Comprehensive Plan

Prime Economic Development: 100%

Economic Development

Advanced Manufacturing: 20%

Data Center: 20%

Flex Office/Warehouse: 20%

Medical: 20%

Multifamily: 15%

Retail: 5%

Mixed-Use

Residential - Utilities: 50%

Flex Office/Warehouse: 20%

Multifamily: 20%

Retail: 5%

Recreation/Open: 5%

LAND BAYS

Land Bay LB 2

Land Bay LB 2 is bounded by Hockett Rd. to the west, Mosaic at West Creek to the east, and Richmond Country Club to the south. It is mostly low density, single family residential with some larger undeveloped parcels. It has 10 parcels and 148.4 acres.

Existing Conditions Metric	LB 2
Distance to Fire-Rescue	5 miles
Water Main Available	Yes
Sewer Main Available	Yes
Connections to Major Roads	Yes

What are the land use assumptions for LB 2 in each scenario?

Current Zoning

Agricultural Limited (A2): 99.6%

Residential Planned (RPUD): 0.4%

Comprehensive Plan

Single-Family - Low Density: 99.34%

Rural Enhancement Area: 0.09%

Semi-Public: 0.57%

Economic Development

Residential - Utilities: 100%

Mixed-Use

Residential - Utilities: 80%

Multifamily: 20%

LAND BAYS

Land Bay LB 3

Land Bay LB 3 is generally bounded by Patterson Ave. to the south, Hockett Rd. to the west, and Richmond Country Club to the east. It includes mostly undeveloped land with some low density, single family residential homes adjacent to Richmond Country Club. It has 40 parcels and 454.2 acres.

Existing Conditions Metric	LB 3
Distance to Fire-Rescue	< 1 mile - 5 miles
Water Main Available	No
Sewer Main Available	No
Connections to Major Roads	Yes

What are the land use assumptions for LB 3 in each scenario?

Current Zoning

Agricultural Limited (A2): 96.3%

Residential General (R3): 3.7%

Comprehensive Plan

Office - No Retail: 92.39%

Single-Family - Low Density: 6.84%

County-Owned/Institutional: 0.77%

Economic Development

Distribution: 35%

Multifamily: 20%

Residential - Utilities: 20%

Flex Office/Warehouse: 15%

Retail: 10%

Mixed-Use

Residential - Utilities: 60%

Multifamily: 20%

Flex Office/Warehouse: 10%

Retail: 10%

LAND BAYS

Land Bay LB 4

Land Bay LB 4 is generally bounded by Patterson Ave. to the south and Creekmore Place to the east. It contains Richmond Country Club and some single family residences. It has 10 parcels and 227.6 acres.

Existing Conditions Metric	LB 4
Distance to Fire-Rescue	< 1 mile - 5 miles
Water Main Available	Yes
Sewer Main Available	Yes
Connections to Major Roads	Yes

What are the land use assumptions for LB 4 in each scenario?

Current Zoning

Agricultural Limited (A2): 99.98%

Residential General (R3): 0.02%

Comprehensive Plan

Recreation/Open Space: 86.0%

Suburban Residential: 14.0%

Economic Development

Recreation/Open: 60%

Residential - Utilities: 25%

Residential - Well & Septic: 10%

Flex Office/Warehouse: 5%

Mixed-Use

Recreation/Open: 60%

Residential - Utilities: 25%

Residential - Well & Septic: 10%

Flex Office/Warehouse: 5%

LAND BAYS

Land Bay LB 5

Land Bay LB 5 is generally bounded by State Route 288 to the west and Patterson Ave. to the north. It includes Benedictine and St. Gertrude's Schools and some single family residential areas. There are also some undeveloped parcels in the middle of this Land Bay. It has 7 parcels and 65 acres.

Existing Conditions Metric	LB 5
Distance to Fire-Rescue	3 - 5 miles
Water Main Available	Yes
Sewer Main Available	No
Connections to Major Roads	Yes

What are the land use assumptions for LB 5 in each scenario?

Current Zoning

Agricultural Limited (A2): 65.4%

Residential Limited (R1): 32.0%

Residential General (R3): 2.3%

Residential Office (RO): 0.4%

Comprehensive Plan

Single Family - Med. Density: 57.7%

County-Owned/Institutional: 32.5%

Semi-Public: 12.8%

Economic Development

Residential - Well & Septic: 100%

Mixed-Use

Residential - Well & Septic: 100%

LAND BAYS

Land Bay LB 6

Land Bay LB 6 is generally bounded by Patterson Ave. to the south, West Creek Pkwy. to the east, and Oak Hill Park Dr. to the west and north. It includes the Patterson Golf Park and some single family residential areas, with some subdivided but undeveloped land. A future street grid is laid out for future single family homes. It has 81 parcels and 60.2 acres.

Existing Conditions Metric	LB 6
Distance to Fire-Rescue	3 - 5 miles
Water Main Available	Yes
Sewer Main Available	Yes
Connections to Major Roads	Yes

What are the land use assumptions for LB 6 in each scenario?

Current Zoning

Residential Neighborhood (RN): 71.9%

Agricultural Limited (A2): 23.2%

Residential Office (RO): 2.6%

Business General (B1): 2.1%

Industrial Limited (M1): 0.1%

Comprehensive Plan

Single Family - Med. Density: 62.2%

Flexible - With Residential: 27.7%

Semi-Public: 10.1%

Economic Development

Residential - Utilities: 100%

Mixed-Use

Residential - Utilities: 60%

Multifamily: 40%

LAND BAYS

Land Bay LB 7

Land Bay LB 7 is generally bounded by State Route 288 to the east, the Goochland County line to the east, and Patterson Ave. to the south. It includes several West Creek properties, including offices and The Collective West Creek multifamily residences. It also includes the Richmond Strikers West Creek Field Complex. It has 33 parcels and 670.2 acres.

Existing Conditions Metric	LB 7
Distance to Fire-Rescue	3 - 5 miles
Water Main Available	Yes
Sewer Main Available	Yes
Connections to Major Roads	Yes

What are the land use assumptions for LB 7 in each scenario?

Current Zoning

Industrial Limited (M1): 99.9%

Business General (B1): 0.07%

Residential Neighborhood (RN): 0.05%

Comprehensive Plan

Prime Economic Development: 95.6%

Rural Enhancement Areas: 4.3%

Semi-Public: 0.7%

Economic Development

Data Center: 50%

Adv. Manufacturing: 25%

Distribution: 20%

Retail: 5%

Mixed-Use

Flex Office/Warehouse: 25%

Adv. Manufacturing: 20%

Medical: 20%

Multifamily: 20%

Retail: 15%

LAND BAYS

Land Bay LB 8

Land Bay LB 8 is generally bounded by State Route 288 to the east and Tuckahoe Creek Pkwy. to the north. It includes the Capital One West Creek campus and some undeveloped land. It has 5 parcels and 297 acres.

Existing Conditions Metric	LB 8
Distance to Fire-Rescue	5 miles
Water Main Available	Yes
Sewer Main Available	Yes
Connections to Major Roads	Yes

What are the land use assumptions for LB 8 in each scenario?

Current Zoning

Industrial Limited (M1): 99.5%

Residential Planned (RPUD): 0.5%

Comprehensive Plan

Prime Economic Development: 100%

Economic Development

Suburban Office Park: 100%

Mixed-Use

Suburban Office Park: 60%

Multifamily: 40%

LAND BAYS

Land Bay WC

Land Bay WC is generally bounded by State Route 288 to the east, Patterson Ave. to the south, and Richmond Country Club to the west. It includes a few West Creek properties, including Kindred Spirit Brewing, as well as some undeveloped land. It has 12 parcels and 168.9 acres.

Existing Conditions Metric	LB WC
Distance to Fire-Rescue	3 - 5 miles
Water Main Available	Yes
Sewer Main Available	Yes
Connections to Major Roads	Yes

What are the land use assumptions for LB WC in each scenario?

Current Zoning

Industrial Limited (M1): 99.8%

Residential General (R3): 0.2%

Agricultural Limited (A2): 0.04%

Comprehensive Plan

Prime Economic Development: 91.7%

Office - No Retail: 8.2%

County Owned/Institutional: 0.2%

Economic Development

Data Center: 40%

Flex Office/Warehouse: 20%

Adv. Manufacturing: 20%

Distribution: 20%

Mixed-Use

Flex Office/Warehouse: 60%

Multifamily: 40%

LAND BAYS

Land Bay B1

Land Bay B1 is generally south of River Rd. and Patterson Ave. to the western edge of the study area. It is largely undeveloped but contains some single family homes along River Rd. It has 23 parcels and is 568.5 acres.

Existing Conditions Metric	B1
Distance to Fire-Rescue	< 1 mile - 3 miles
Water Main Available	No
Sewer Main Available	No
Connections to Major Roads	Yes

What are the land use assumptions for B1 in each scenario?

Current Zoning

Agricultural Limited (A2): 83.5%

Residential Limited (R1): 11.3%

Residential General (R3): 4.9%

Comprehensive Plan

Single Family - Low Density: 100%

Economic Development

Residential - Utilities: 65%

Multifamily: 15%

Retail: 10%

Recreation/Open: 10%

Mixed-Use

Residential - Utilities: 65%

Multifamily: 15%

Retail: 10%

Recreation/Open: 10%

LAND BAYS

Land Bay B2

Land Bay B2 is bounded by State Route 288 to the east, the James River to the south, and Patterson Ave. to the north. It includes the St. Catherine's School playing fields and some low density, single family residential neighborhoods. It has 4 parcels and 72.6 acres.

Existing Conditions Metric	B2
Distance to Fire-Rescue	1 - 3 miles
Water Main Available	Yes
Sewer Main Available	No
Connections to Major Roads	Yes

What are the land use assumptions for B2 in each scenario?

Current Zoning

Agricultural Limited (A2): 79.6%

Residential Limited (R1): 13.0%

Residential General (R3): 4.6%

Industrial Limited (M1): 1.4%

Business General (B1): 1.3%

Comprehensive Plan

Single Family - Low Density: 65.0%

Recreation/Open Space: 32.5%

Flexible - With Residential: 2.5%

Rural Enhancement Area: 0.04%

Semi-Public: 0.03%

Economic Development

Residential - Well & Septic: 100%

Mixed-Use

Residential - Well & Septic: 100%

DEVELOPMENT IMPACTS ESTIMATOR TOOL

Capacity Assumptions

The Development Impacts Estimator Tool calculates the impact of uses as featured in the development scenarios on infrastructure use and estimates any additional capacity required. To make these estimates, the project team used several standards for each of the infrastructure and revenue categories. Those assumptions are covered below.

Developable Land

It is reasonable to assume that not all vacant land will eventually be developed. Undevelopable land is common, and can be the result of many different real-world conditions, including but not limited to water bodies, floodplains, steep slopes, infrastructure (like roads), or easements.

For the evaluated scenarios, the project team assumed that only 75 percent of land was developable. The tool allows for adjustments to this assumption by land bay.

Buildout Extent

The model allows for different levels of buildout of vacant land. This allows for a single scenario to be explored at multiple stages of its development timeline. The current version of the tool includes four buildout stages – 10%, 25%, 50%, and 90%. These percentages describe the portion of the currently undeveloped land that gets converted to development. These can be adjusted or added to at the user's discretion.

Housing Units

Converting residential acreage to housing units was done using the current zoning code allowances and the County's Comprehensive Plan or other policy recommendations on housing density per discussions with County staff. The assumed residential intensity varies based on whether utilities, such as public water and sewer, are available. They are listed in the following table.

Land Use Type	Housing Units Per Acre
Residential - Well & Septic	1
Residential - Utilities	2.5
Multifamily	12

Commercial Square Footage

The size and extent of future commercial development is an important input to the Development Impacts Estimator Tool. This contrasts with residential development, where the number of units is what matters most for measuring impacts on infrastructure. Assumptions about the size and extent of future commercial development is based on a calculated proportion of acreage converted to commercial square footage. The ratios were set based on existing ratios of actual development, typically within the SIS area, but occasionally based on the larger prime economic development area within Goochland County, to allow for sufficient data. For data centers, which currently do not exist within Goochland County, two existing data centers elsewhere in Virgina were used as models. The commercial development intensities used in the model are listed in the table below.

Land Use Type	Lot Coverage (% Building Sq. Footage Relative to Parcel Size)
Flex Office/ Warehouse	0.10
Suburban Office Park	0.08
Adv. Manufacturing	0.15
Data Center	0.15
Retail	0.36
Medical	0.15
Recreation/Open	0.00
Distribution	0.13

DEVELOPMENT IMPACTS ESTIMATOR TOOL

Capacity Assumptions

Roadways/Traffic

The project team estimated trips resulting from future development based on the Institute for Transportation Engineer's (ITE) Trip Generation Handbook. ITE Codes and the associated average daily trips per unit or per 1,000 gross floor area used for this model are shown below. ITE is the national standard for estimating trips and is used in Goochland County and across the state for this type of forecasting. Total trips were then summed for the entire scenario based on commercial square footage and housing estimates.

This sum was compared to the estimated 19,000 trip capacity on Highway 6. The model then outputs both the total estimated trips, and the estimated equivalent new lanes needed to accommodate that new capacity. It is important to note that no trip assignment has been done in these calculations, so the actual number and locations of lanes is outside the capabilities of this model. However, it provides a reasonable estimate of how much new roadway capacity would be needed. This model is not a substitute for traffic impact and traffic safety analyses often required during proposed development review.

Land Use Type	ITE Code	Trips	per
Flex Office/ Warehouse	710 & 150	6.275	1,000 GFA
Suburban Office Park	710	10.84	1,000 GFA
Adv. Manufacturing	140	4.75	1,000 GFA
Data Center	160	0.99	1,000 GFA
Retail	822	54.45	1,000 GFA
Medical	630	37.6	1,000 GFA
Distribution	150	1.71	1,000 GFA
Residential - Well & Septic	210	9.43	unit
Residential - Utilities	210	9.43	unit
Multifamily	220	6.74	unit
Recreation/Open	411	0.78	acre

Water & Sewer

Water and sewer use expectations are based on two primary sources: the EPA Commercial Building Energy Consumption Survey (2012) and the 2018 Goochland County Utilities Master Plan. The EPA survey provided water usage estimates by gross square footage for several of the commercial uses in the model. For residential water and sewer use, the project team used the County's Utilities Master Plan. For commercial sewer use, no preferred source was identified. Residential sewer use estimates from the Utilities Master Plan suggested that sewer use was well under water use. But to ensure that any commercial estimate was not artificially low, commercial sewer use was set as 95 percent of commercial water use. This number should be adjusted if better sources are identified in the future. County staff provided water and sewer capacity information, and indicated that both had much more capacity than any buildout scenario would require, limiting the potential negative impacts to water and sewer systems.

The SIS area is serviced by the Eastern Goochland Water and Wastewater Systems which operate under usage agreements with Henrico County and the City of Richmond. The water system currently has a usage of 800,000 gallons per day with an overall capacity of 5.25 million gallons per day. The wastewater system

Capacity Assumptions

currently uses 500,000 gallons per day and has an overall capacity of 5 million gallons per day with the ability to increase that to 15 million gallons per day with an updated to the Water/Wastewater Treatment Plant.

Tuckahoe Creek Service District (TCSD)

While overall capacity for both water and wastewater is abundantly available in the SIS area, the infrastructure lines to extend those services are provided via the Tuckahoe Creek Service District.

The TCSD was created in 2002 to provide water and sewer services to the area and provide a mechanism for payment for those services. Within the SIS area, the TCSD generally provides for water/sewer services north of Patterson Avenue.

There are limited to no water/sewer lines south of Patterson Avenue.

Schools

The project team assumed new school-aged, public school attending children to constitute 0.38 persons per new households. This number is consistent with both the typical household size in Goochland County per the 2022 American Community Survey and based on the projections made in the Goochland County Schools Enrollment Projection Report (March 2024).

Based on conversations with representatives of Goochland County Schools, the model assumes an average classroom size of 19 children as the conversion from new school-aged children to classrooms. Note that this number is not similar for elementary, middle, and high school classrooms, respectively, but this model did not differentiate between primary and secondary school children, so used this overall average number.

Fire & Rescue

The fire and rescue capacity analysis only considers the building footprint needed for any new Fire-Rescue Facility. However, it is worth noting that this is only one part of the overall needs assessment for any new station, which includes land (generally 5 to 8+ acres), equipment, and staffing. As such, this infrastructure analysis should only be considered a portion of the overall analysis needed for a full evaluation of fire and rescue needs stemming from future SIS area growth.

The analysis used the metrics contained in the 2018 Goochland County Capital Impacts Study to determine the fire and rescue capacity needs for each of the development scenarios.

Annual Tax Revenue

This analysis is built upon existing building and improvement values per square foot by land use for existing buildings in the SIS and the larger prime economic development area. The per square foot building and improvement area values provided by the County Assessor's Office are applied to all new development by development type. In the case of data centers, of which there are none in the County to date, an amalgam of data from data centers in other counties and states.

DEVELOPMENT IMPACTS ESTIMATOR TOOL

Using the Tool

The Development Impacts Estimator Tool has two user interfaces. The first user interface allows a user to explore the capacity implications of developed scenarios. The user can make three selections: the scenario concept and the buildout extents are the primary selections, with a third selection allowing users to determine if utility connections are envisioned in the southwest quadrants of the study area (water and sewer utilities are limited in this area, which limits the potential for growth and development). Upon making a selection, the Development Impacts Estimator Tool will summarize the amount of new growth by category (commercial square footage, housing, etc.), and compare that growth to existing capacity, providing a estimated capacity implication. There are other inputs that users can adjust on this interface, including the percent of developable land by land bay and the buildout extent percentages, but these do not need to be changed to evaluate a scenario.

The second user interface allows a user to explore how long it will take a scenario to reach a user-predetermined amount of future growth. Users can select a scenario type and a specific amount of growth in one category (for example, 250 housing units), and the tool will return the buildout extent needed to meet that growth amount.

SOUTHEASTERN INFRASTRUCTURE STUDY SCENARIO EVALUATION TOOL

USER INPUTS - FUTURE DEVELOPMENT STYLE & BUILDOUT EXTENT

Scenario Concept

Economic Development

Buildout Extent

Full (90% Buildout)

Scenario Definition

This scenario envisions a commercial and higher-intensity residential development pattern that emphasizes economic activity in the area

OUTPUT - NEW GROWTH

	Comm. SF	Single Family Units	Multi-Family Units	Trips	Students
Scenario Total	4,353,000	220	770	67,980	80

Water (GPD)	Sewer (GPD)	F&R Facility (SqFt)	Assessed Value
750,000	608,000	14,930	$ 608,586,000

CAPACITY IMPLICATIONS

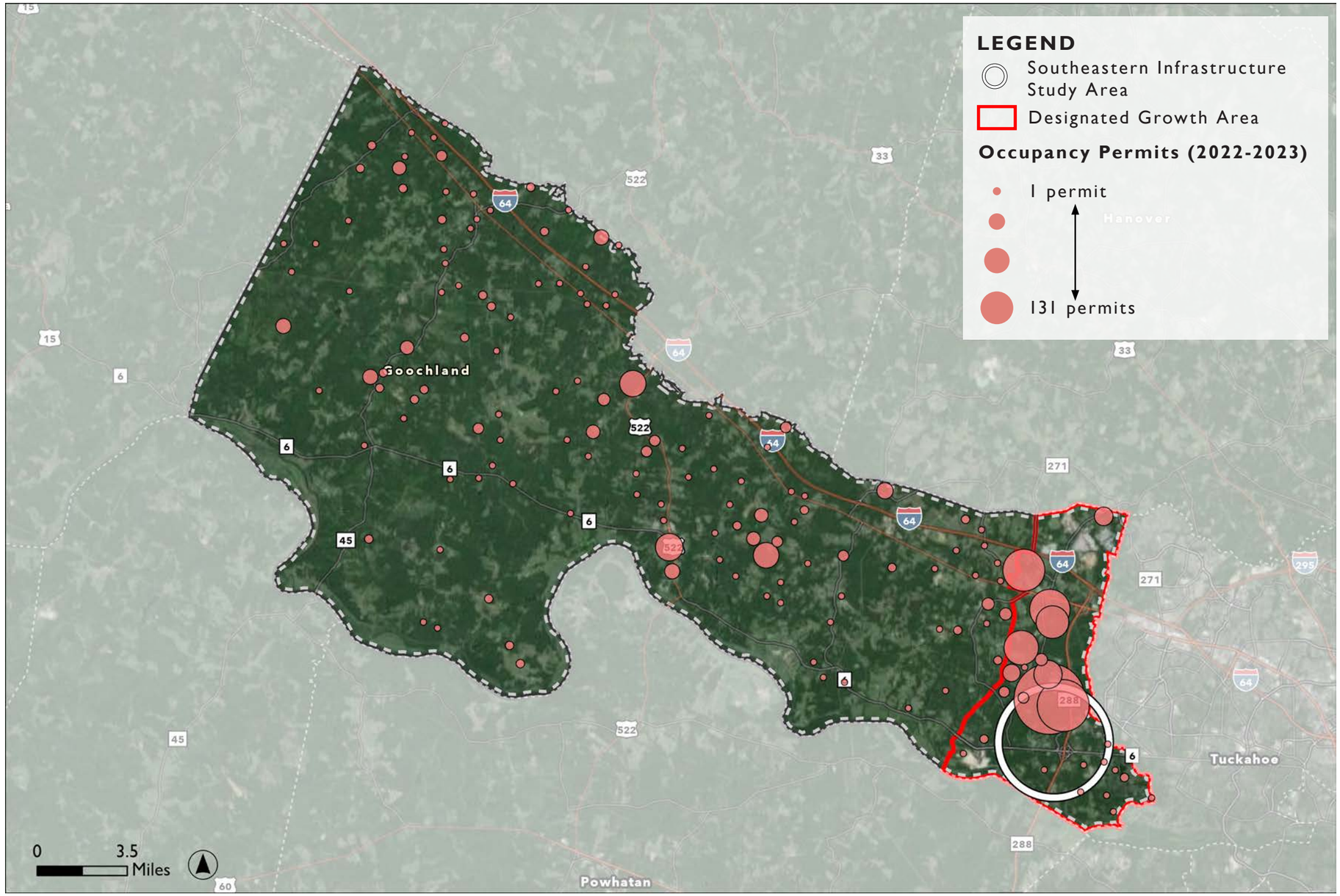
Comm. SF	Single Family Units	Multi-Family Units	Trips	Schools
4.2x	**6%**	**20%**	**4**	**5**
existing comm. SF	of 20-year housing need	of 20-year housing need	new lanes	new classrooms

Water	Sewer	Fire & Rescue	Annual Tax Revenue
15%	**4%**	**100%**	**$ 12,030,000**
of available capacity	of available capacity	of minimum facility size	

III. STUDY AREA CONTEXT

Rate of Development

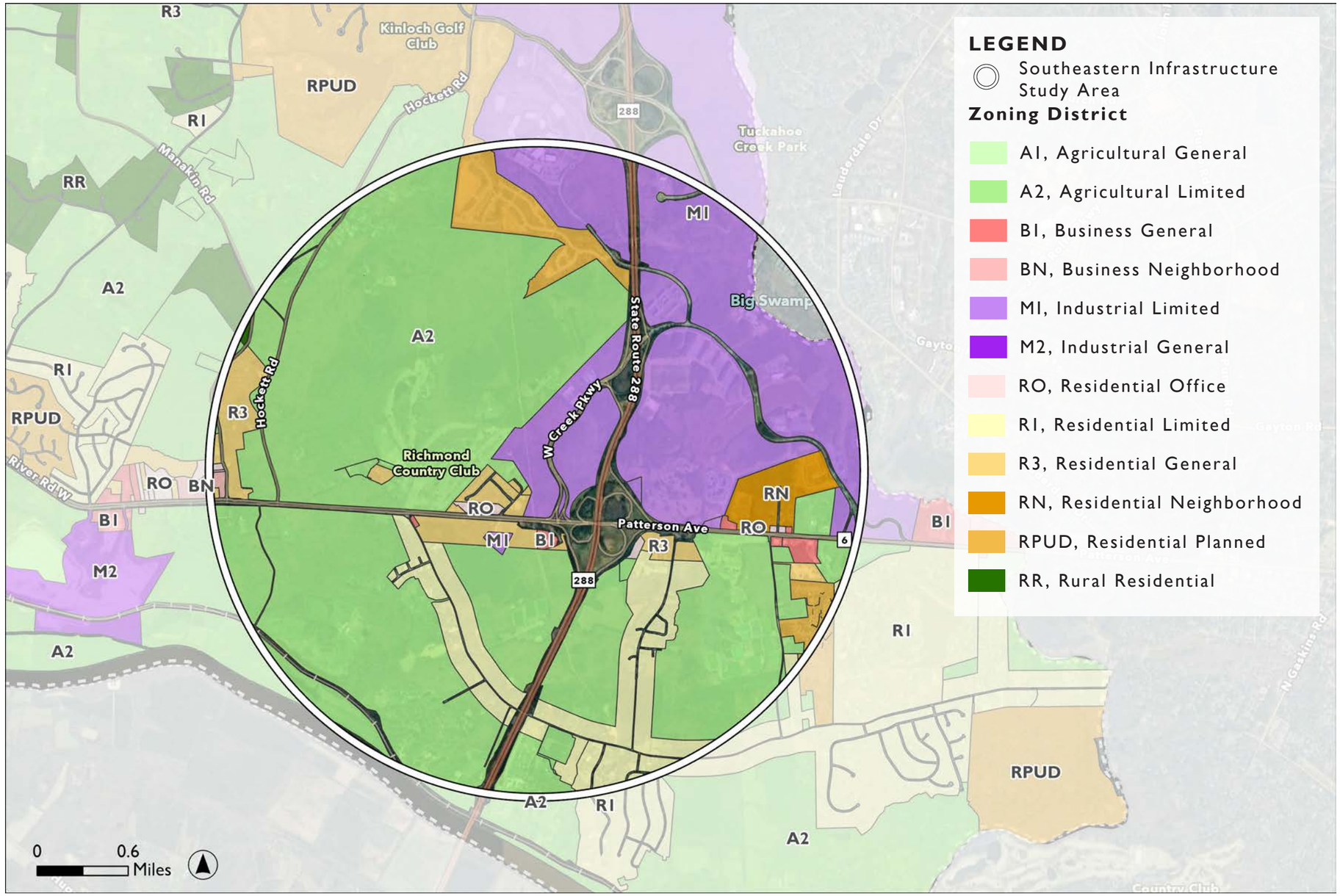
As noted above, Goochland was Virginia's second fastest growing County between 2020 and 2023. With that growth comes increased demand for schools, fire and rescue, roads, and many other public services and infrastructure. The majority of residential development in the County is occurring within the DGA, with a significant portion occurring in the northern portion of the SIS study.



ZONING

The vast majority of land in the SIS is zoned A2, Agricultural Limited, in which most of the uses permitted by-right are related to residential agriculture. Single-family detached homes are allowed by-right, but the vast majority of commercial uses are only conditionally permitted.

The areas within West Creek (West Creek is a “planned development park” which is further defined in the zoning code) are part of the M1, Industrial Limited, zoning district – whose intent, as per the zoning ordinance, is “to permit certain industries, ones which do not in any way detract from residential desirability, to locate adjacent to residential uses.” Parcels surrounding River Road and Pagebrook Drive are zoned R1, Residential Limited, which only allows single-family dwellings and certain public uses like parks and places of worship.

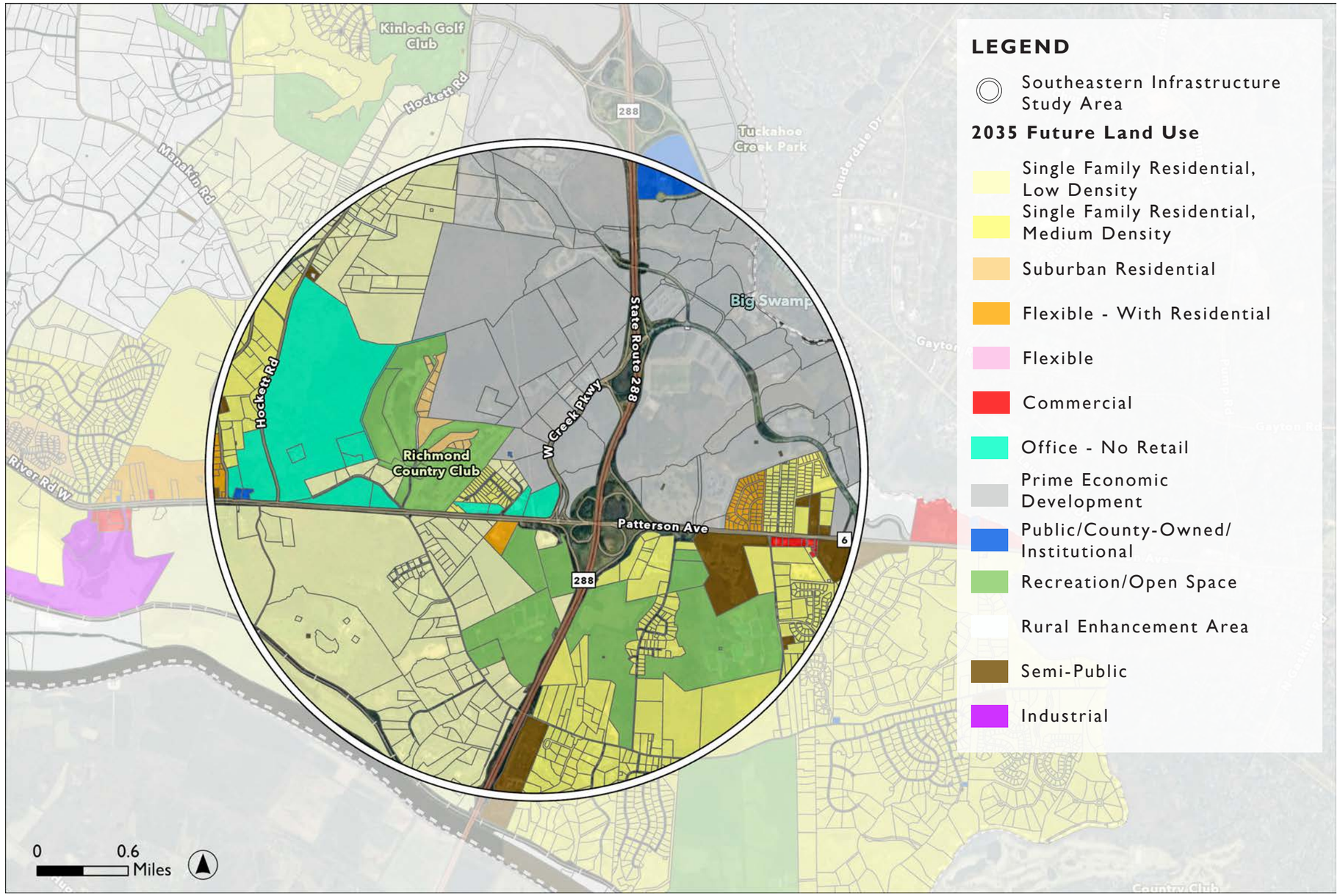


FUTURE LAND USE

Goochland's most recent (2035) Comprehensive Plan envisions future land use within the SIS area to consist of a mix of uses including Prime Economic Development, Office – No Retail, Low and Medium Single Family Residential, and Recreation/Open Space, among other uses.

As the development market has changed in the last five years (post Covid), the uses envisioned in the Comprehensive Plan may no longer represent the most likely development types.

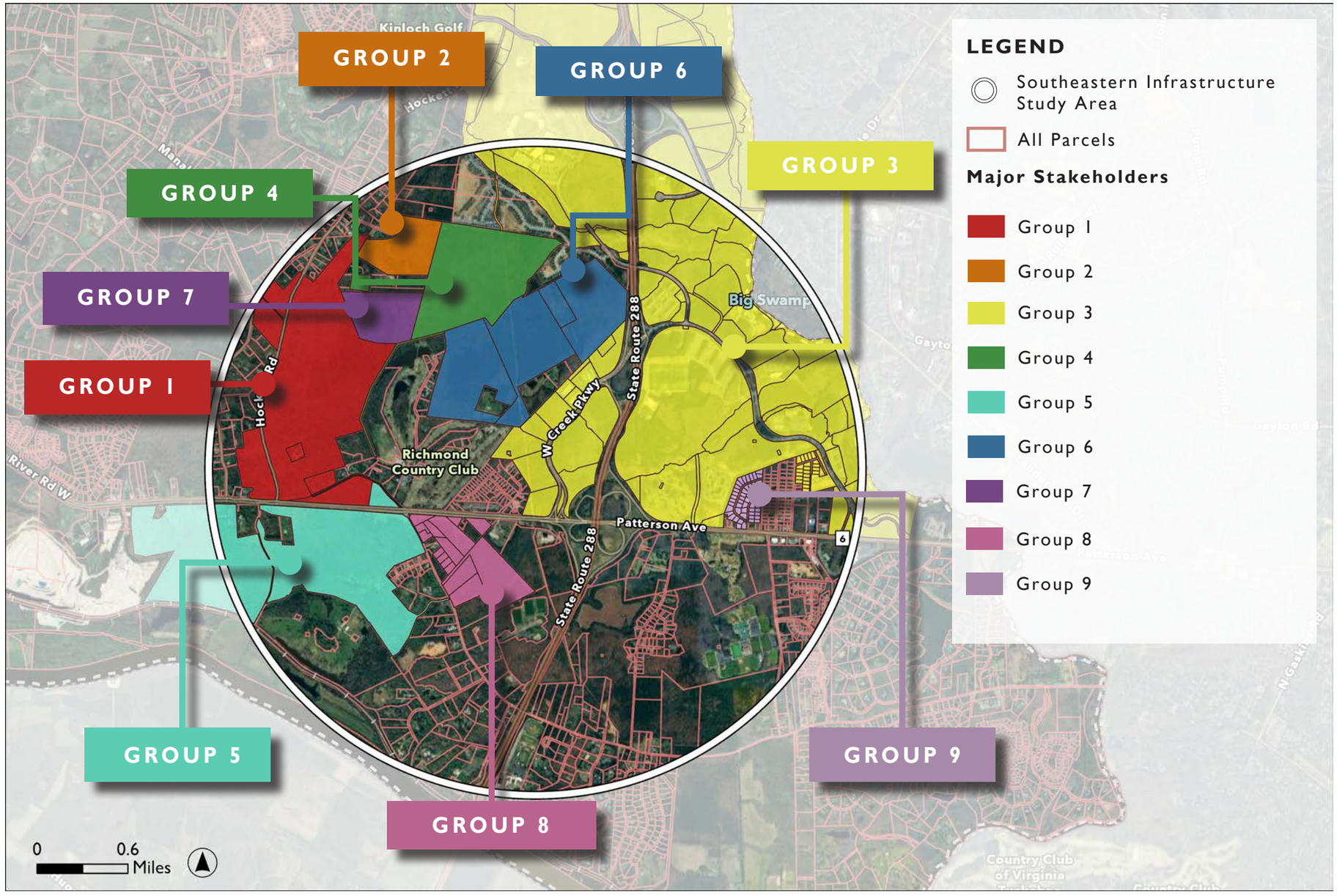
For example, the Comprehensive Plan calls for a large amount of office space with no retail. With more hybrid and work from home options available, the market for large amounts of new office space is currently in decline.



STAKEHOLDERS

A majority of the land in the SIS is controlled by several major landholders and stakeholders, who have a vested interest in the future of this area. The study team met with each of the stakeholders either individually or in groups to learn about any plans for development of the land areas and to better understand their vision for the SIS area.

These meetings helped focus the study toward the infrastructure needs of each area required for development of the parcels. This study does not contain any specific recommendations toward the type or nature of development (or location of infrastructure) which should occur on the parcels.



EXISTING ASSETS

Existing development and assets in the study area include a mix of public, institutional, office, recreational, and housing development.

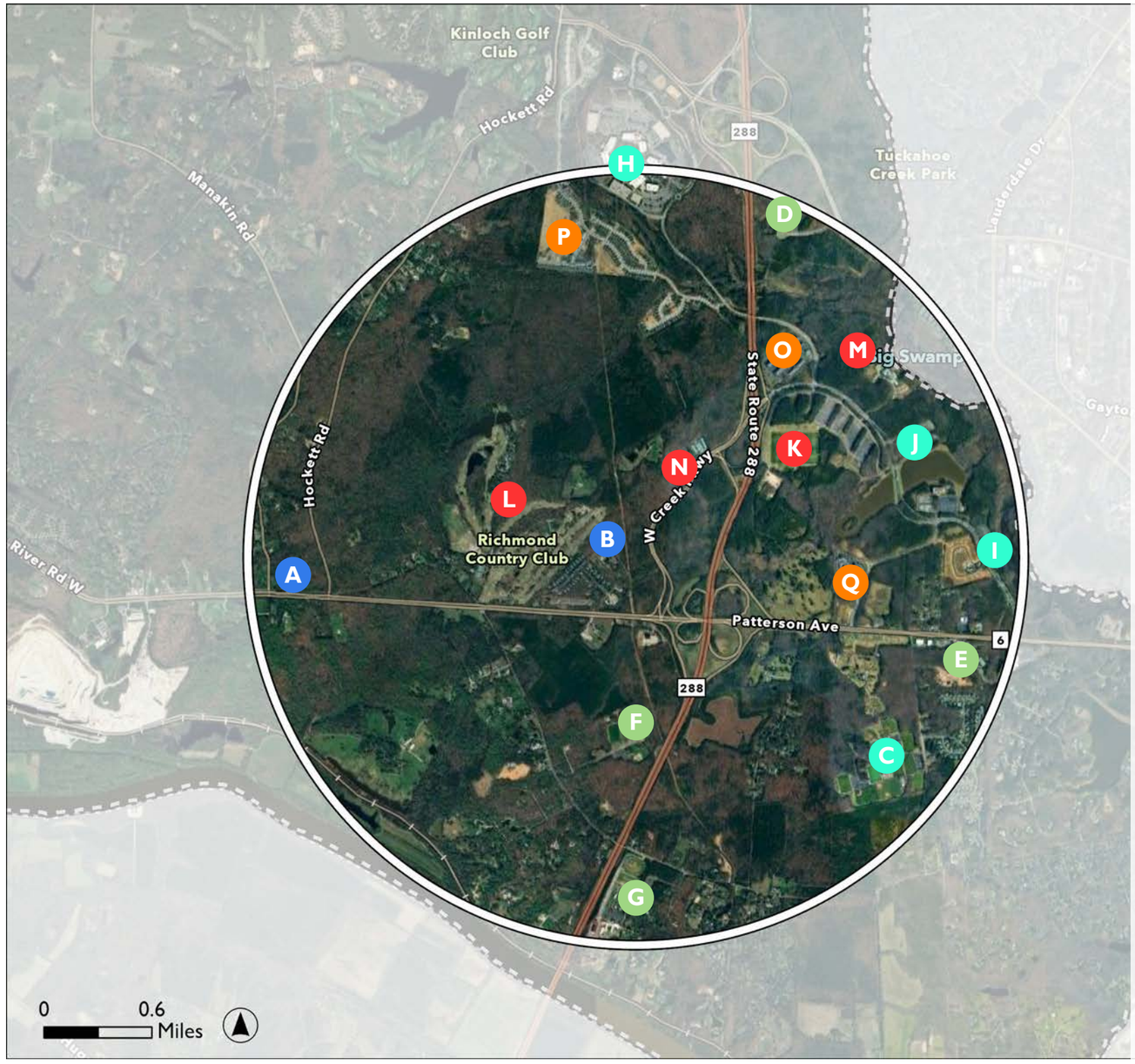
Public uses include the Manakin Fire-Rescue Station located along Patterson Avenue near Mankin Road and the West Creek Water Tower.

Institutional uses include two private schools' athletic facilities (Collegiate and St. Catherine's), the HCA Hospital site (currently vacant as of the date of this report), and Hope Church campus and other worship facilities, among others.

Several significant office uses in the SIS area include Capital One West Creek Campus, Performance Food Group, and the Virginia Farm Bureau Insurance facilities.

The area includes recreational and entertainment assets including the Richmond Strikers facility, the Richmond Country Club, Hardywood Brewery and Kindred Spirits Brewery.

Housing development (either completed or ongoing) in the area include two apartment developments (2000 West Creek and Collective at West Creek) and the single family Mosaic development. Additional housing is located south of Patterson Avenue in completed, established neighborhoods.



LEGEND

Public Assets

- A — Manakin Fire-Rescue
- B — West Creek Water Tower

Institutional Assets

- C — Collegiate Athletic Fields
- D — HCA Hospital
- E — Hope Church
- F — St. Catherine's Athletic Fields
- G — St. Gertrude's and Benedictine

Office Assets

- H — Capitol One West Creek Campus
- I — Performance Food Group
- J — Virginia Farm Bureau Insurance

Recreational/Entertainment Assets

- K — Richmond Strikers
- L — Richmond Country Club
- M — Hardywood Brewery
- N — Kindred Spirits Brewery

Housing Assets

- O — 2000 West Creek Apartments
- P — Mosaic at West Creek
- Q — The Collective at West Creek

IV. EXISTING CONDITIONS

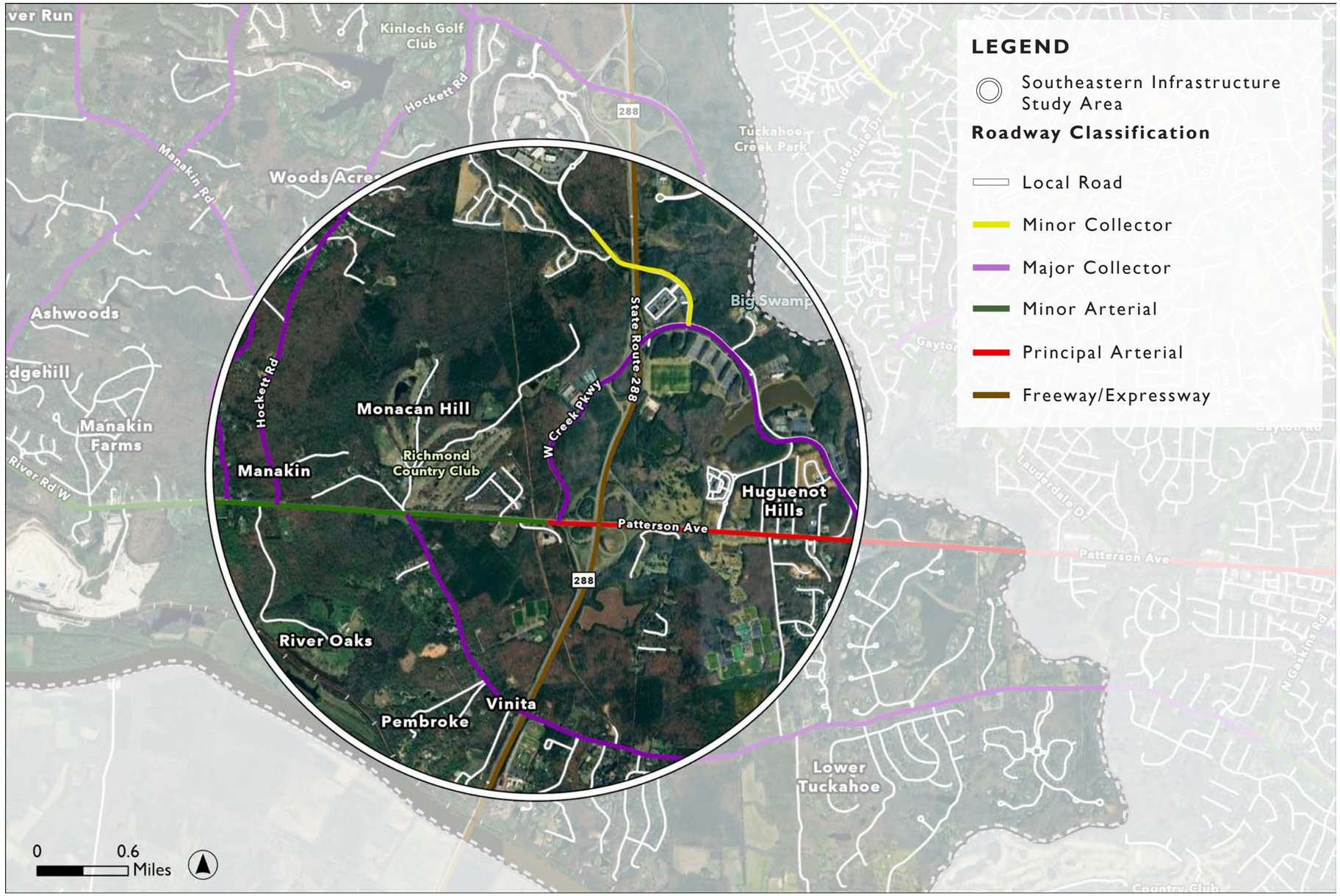
Existing Roadways

The study area lies in the interchange of State Route 288 and Patterson Avenue, State Route 6. Route 288 bifurcates the study area from the north to south while Patterson Avenue bifurcates the area from the east to west.

Patterson Avenue is a principal arterial roadway in the eastern portion of the study area and transitions to a minor arterial west of West Creek Parkway.

The study area includes several major collector roadways (West Creek Parkway, River Road, Hockett Road, and Manakin Road. Broad Branch Boulevard is a minor collector roadway from West Creek Parkway north to the entrance to Capital One where it becomes a private road.

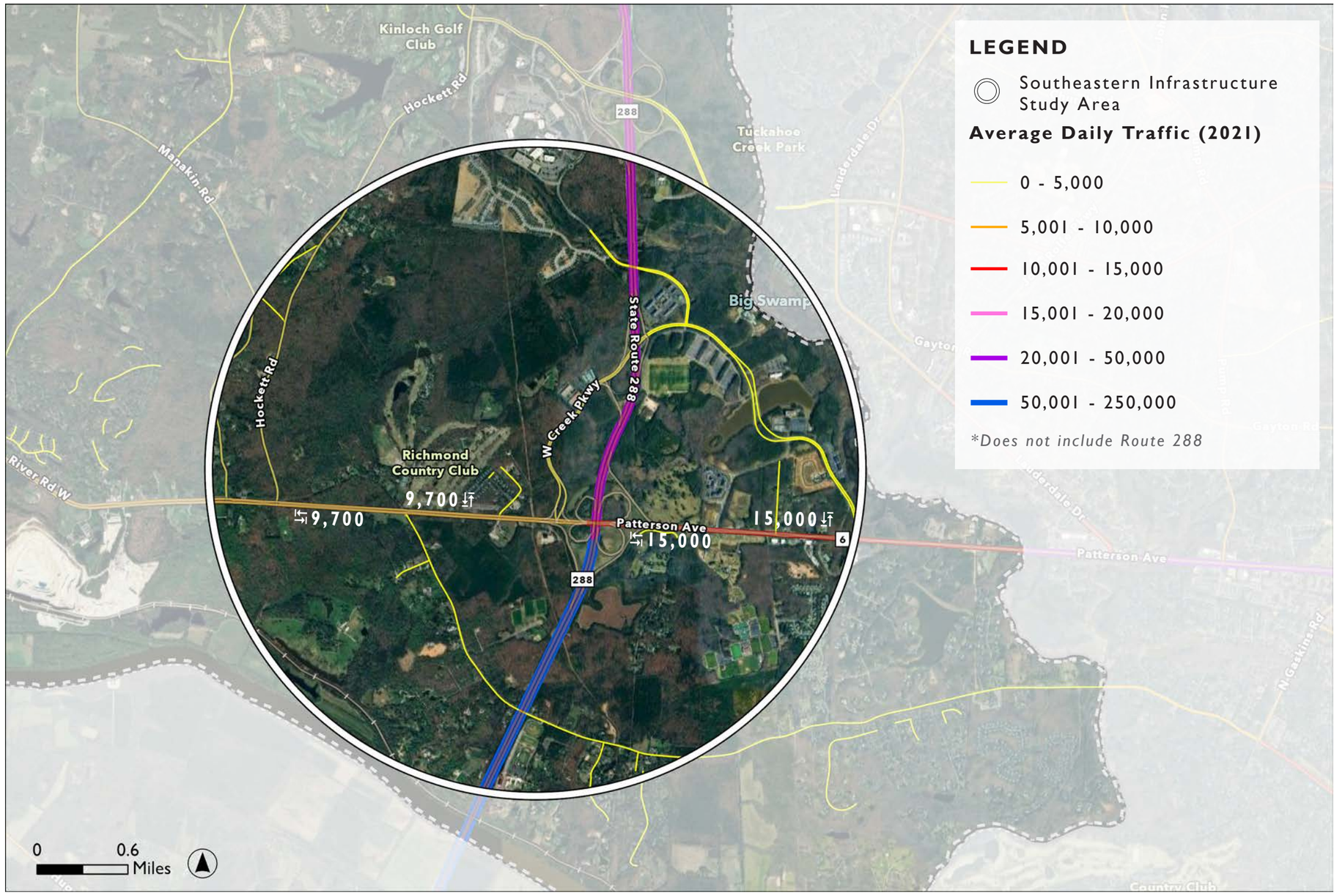
All other roads in the study area are classified as local or private roads.
All public roadways are owned and maintained by the Virginia Department of Transportation. Route 288 was excluded from the analysis.



EXISTING CONDITIONS: ROADWAYS

Average Daily Traffic

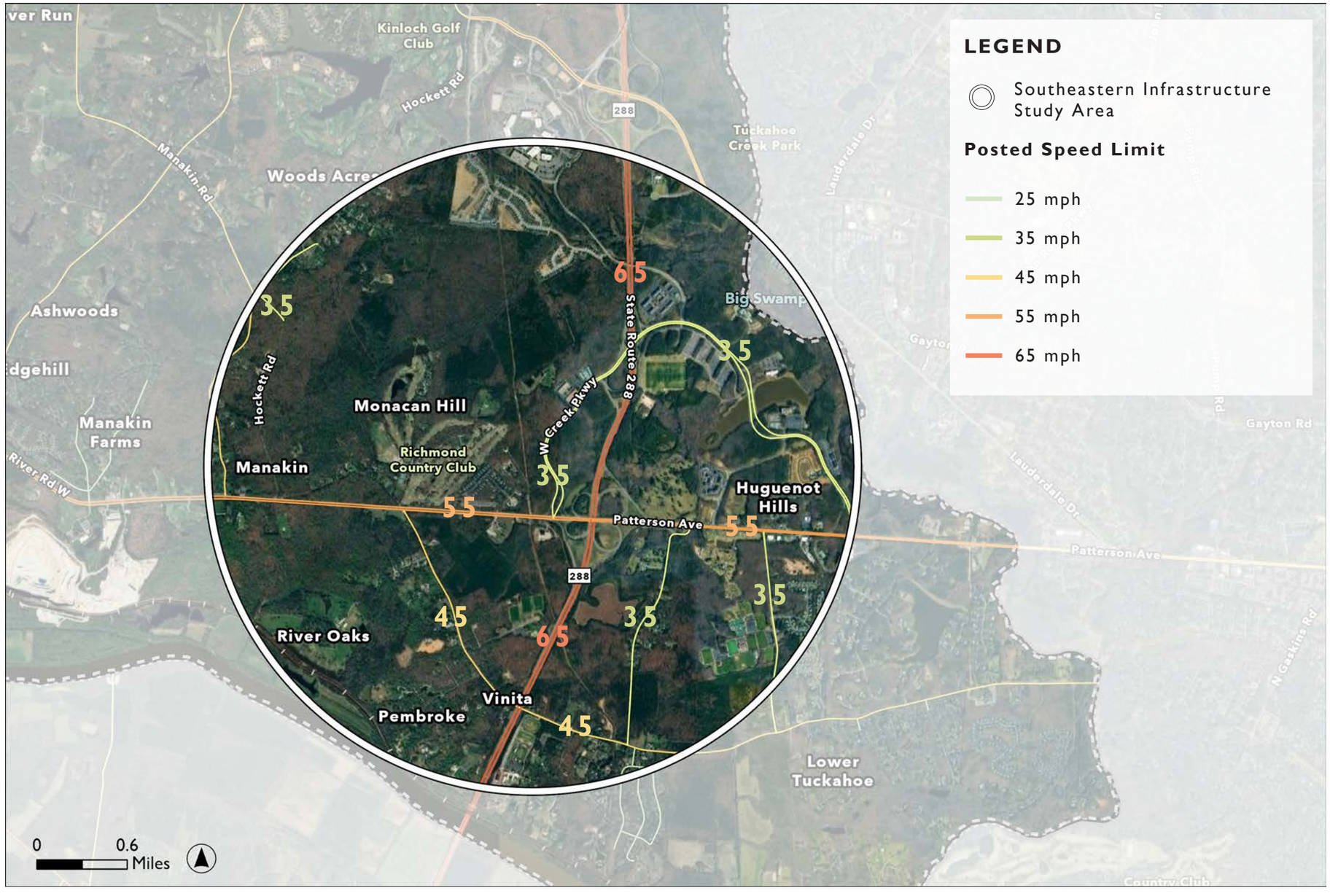
VDOT measures the Average Annual Daily Traffic (AADT) for major roads in the state. Some of the roads measured that were below 5,000 cars daily included River Road and West Creek Parkway. Route 288 south of Patterson Ave. has the highest daily traffic in the study area, with 54,000 cars in each direction. Once the route crosses north of Patterson Ave., that drops to 42,000 cars in each direction, suggesting that a large amount of drivers are exiting at Patterson Ave. Similarly, Patterson Ave. east of Route 288 has 15,000 cars in each direction, but once it is west of Route 288, there are 9,700 cars in each direction, suggesting that almost half of drivers are traveling on Patterson to get onto State Route 288.



EXISTING CONDITIONS: ROADWAYS

Speed Limit

West Creek Parkway, Pagebrook Drive, and Blair Road all have speed limits of 35 mph. River Road has a speed limit of 45 mph, while Patterson Avenue has a speed limit of 55 mph and Route 288 has a speed limit of 65 mph. All other roadways in the area are posted at 25 mph.

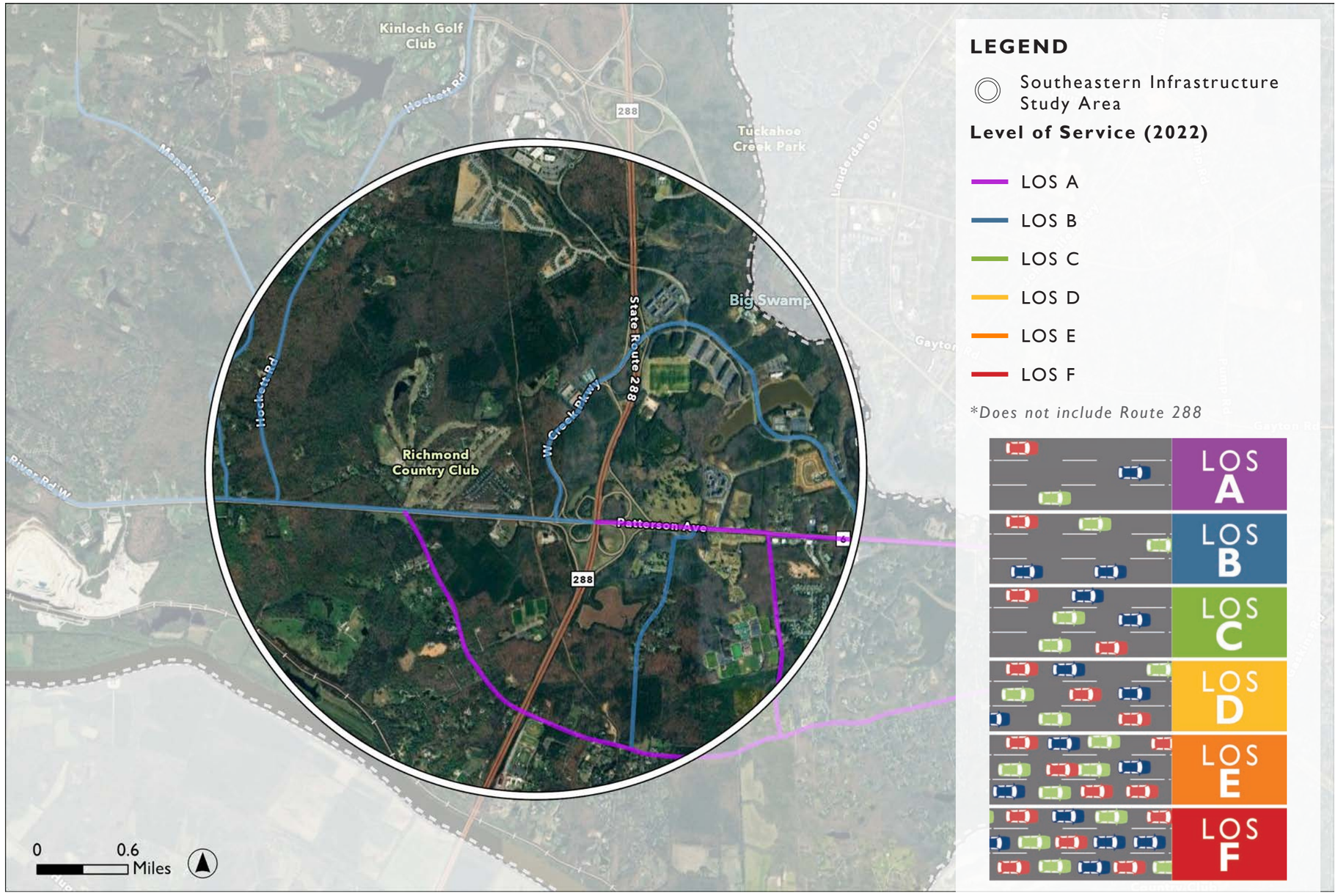


EXISTING CONDITIONS: ROADWAYS

Level of Service (LOS)

Level of Service (LOS) is a measure of traffic flow, with a scale from A to F, with LOS A representing the best operating conditions and LOS F the worst conditions. LOS A describes a free flow state, where there are low volumes and no delays related to traffic. Using the VDOT ADT's an analysis was conducted to determine the LOS of each of the roadways within the study area. River Road, Blair Road, and Patterson Avenue east of Route 288 are determined to be LOS A.

Patterson Avenue west of Route 288, West Creek Parkway, Pagebrook Drive, and Hockett Road are defined as LOS B. Overall, the study area roadways have abundant capacity to accommodate the average daily traffic. Certain intersections (Patterson Avenue at River Road and West Creek Parkway at Broad Branch Boulevard) may experience delay in the commuter peak hours.



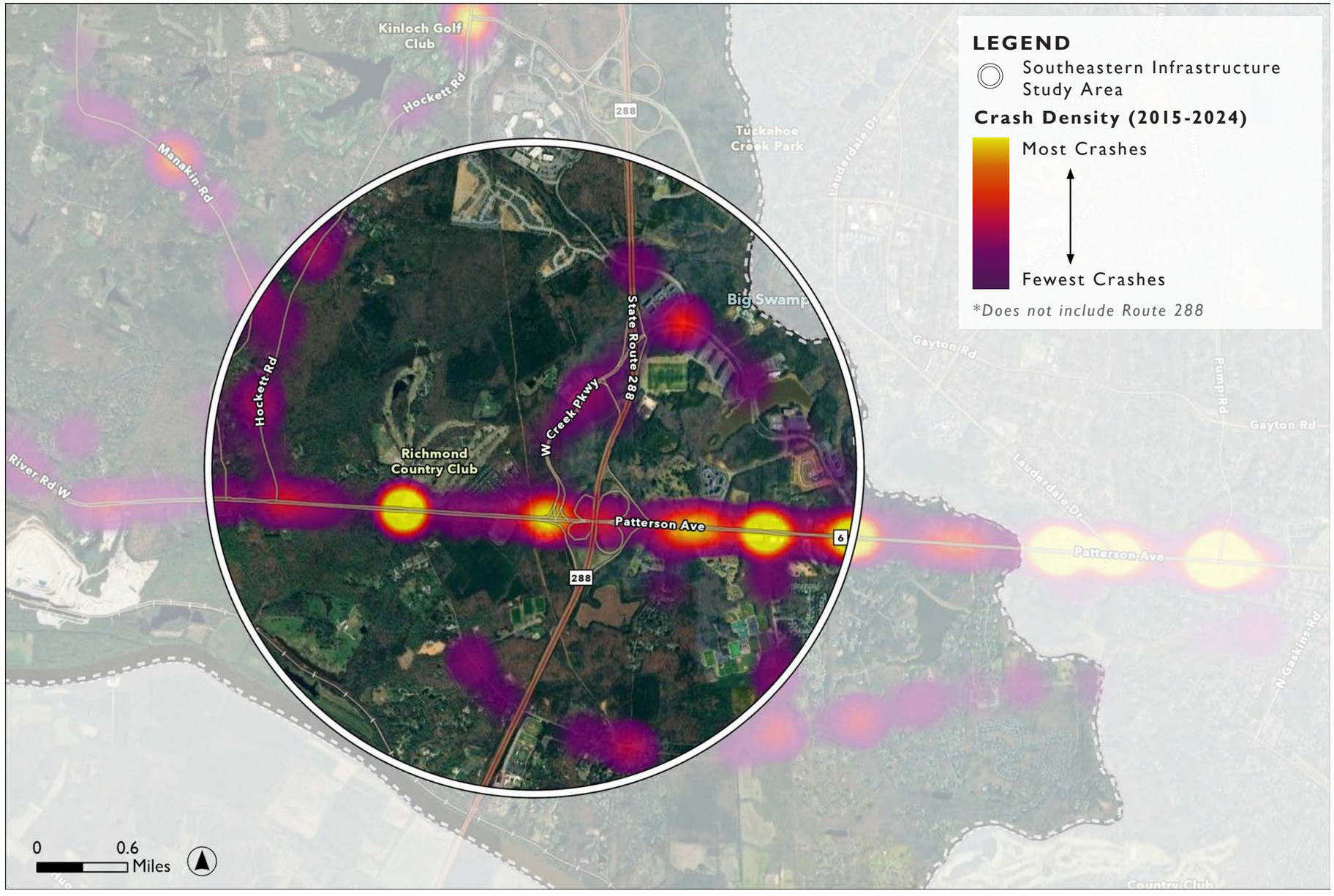
EXISTING CONDITIONS: ROADWAYS

Crash Density

This map shows the density of crashes in the study area from 2015-2024. The brighter colors indicate a higher occurrence of crashes along the roadway or at an intersection.

The analysis indicates that the highest occurrence of crashes occurs at intersections along Patterson Avenue including the River Road, West Creek Parkway (west) and West Creek Parkway (east).

It is noted that VDOT recently installed a traffic signal at the Patterson Avenue/Blair Road intersection which should help reduce the occurrence and severity of crashes at that intersection.



EXISTING CONDITIONS: ROADWAYS

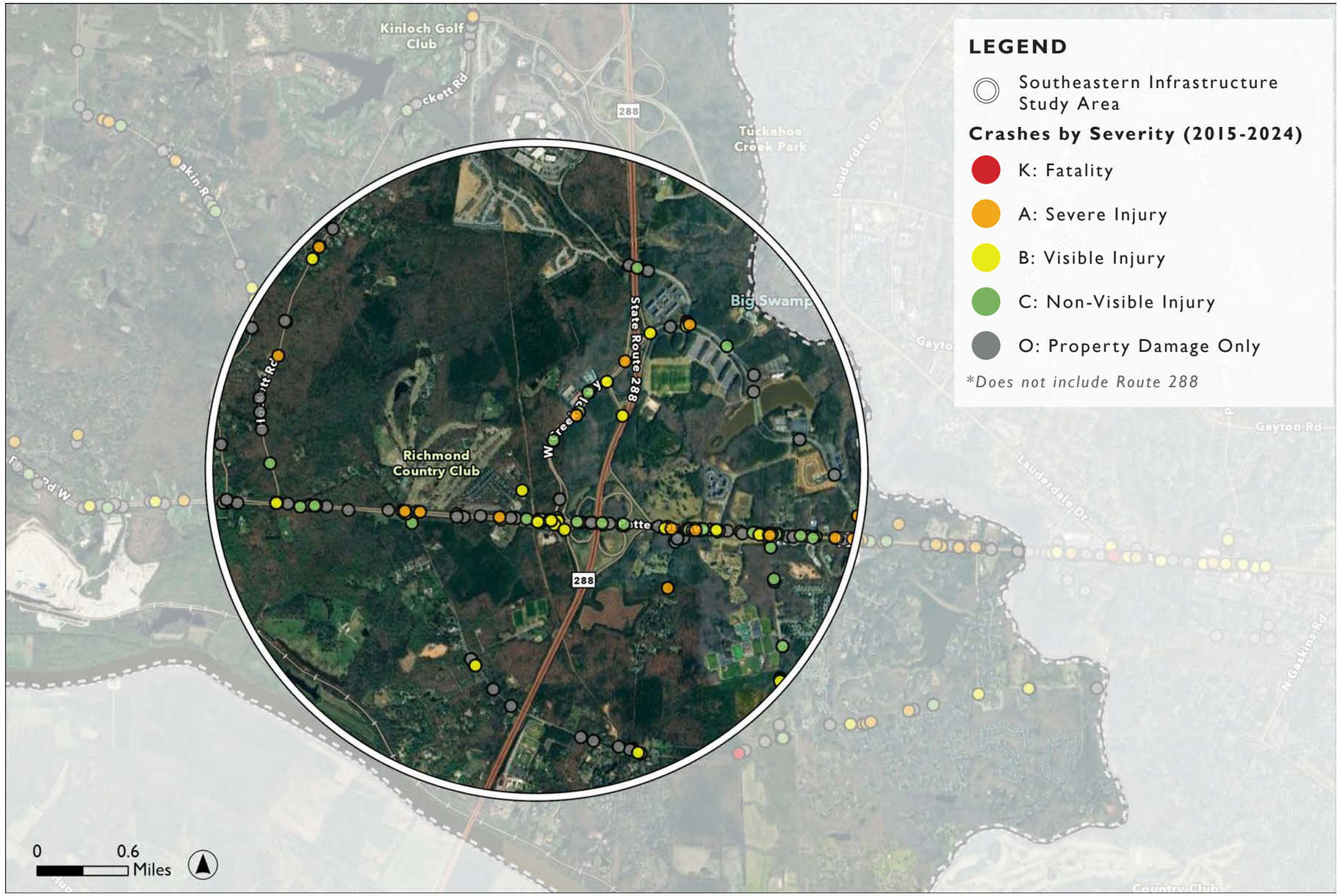
Crashes by Severity

Crashes were also analyzed to determine the severity of the incident and are rated on the KABCO scale.

Crashes resulting in a fatality are assigned the letter K on the scale and appear red on crash maps. Crashes that result in injuries are subdivided into three categories: Severe or incapacitating injuries are assigned the letter A and appear orange on crash maps. Crashes that result in visible injuries that are non-incapacitating are assigned the letter B and appear yellow while crashes that result in non-visible injuries are assigned the letter C and appear green.

Crashes that result in property damage only are assigned the letter O and appear gray on crash maps.

There were no fatal crashes within the study area roadways from 2015-2024 (excludes Route 288) but there were a substantial number of all other crash types.



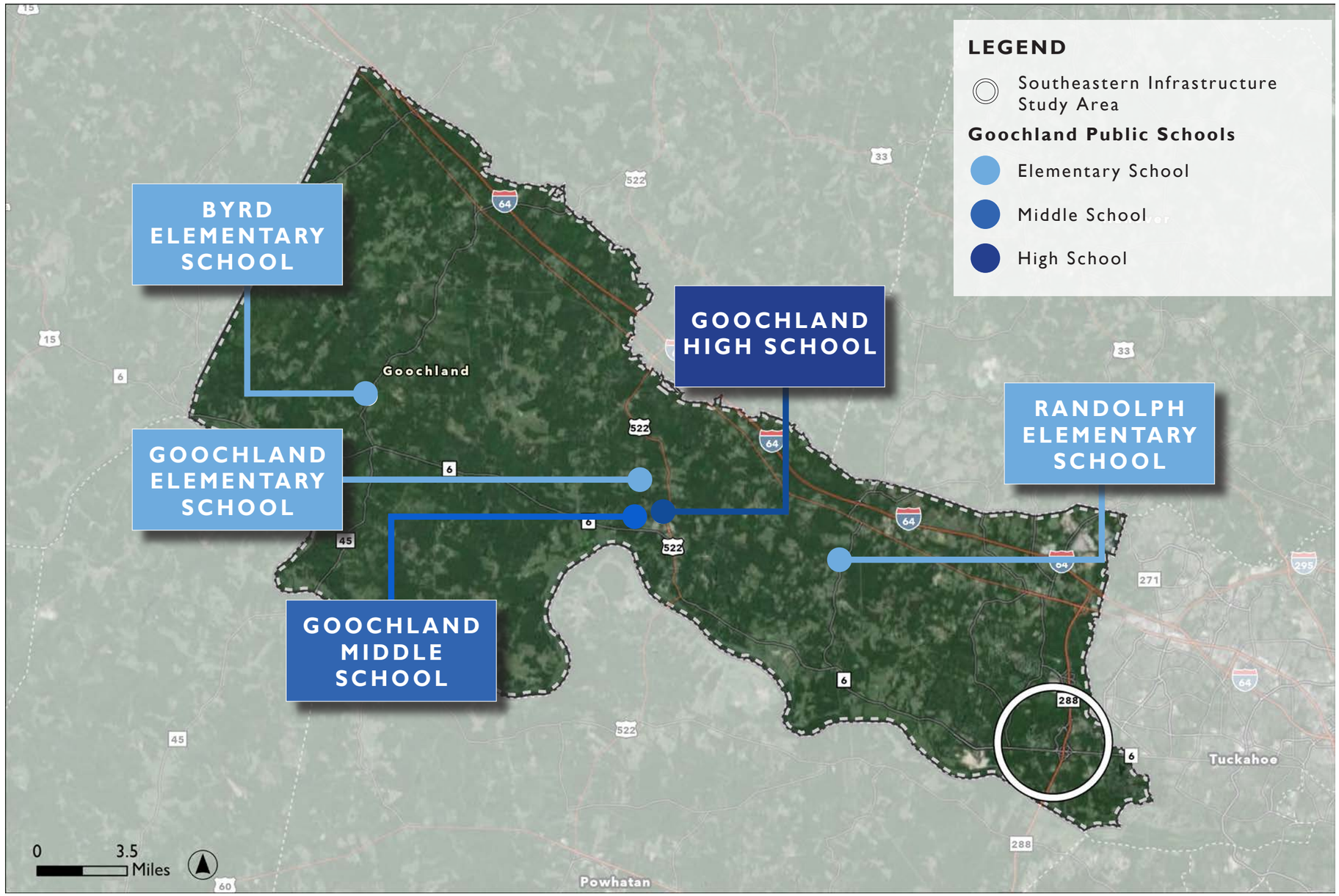
EXISTING CONDITIONS: SCHOOLS

Existing Schools

There are 5 schools in the Goochland Public School system, with 3 elementary schools (Byrd Elementary, Goochland Elementary, and Randolph Elementary), Goochland Middle School, and Goochland High School. Children under 18 represent almost 1/5 of the Goochland population, and almost 1/4 of households in the County have children under 18. The public school system encompasses more than 2,500 students.

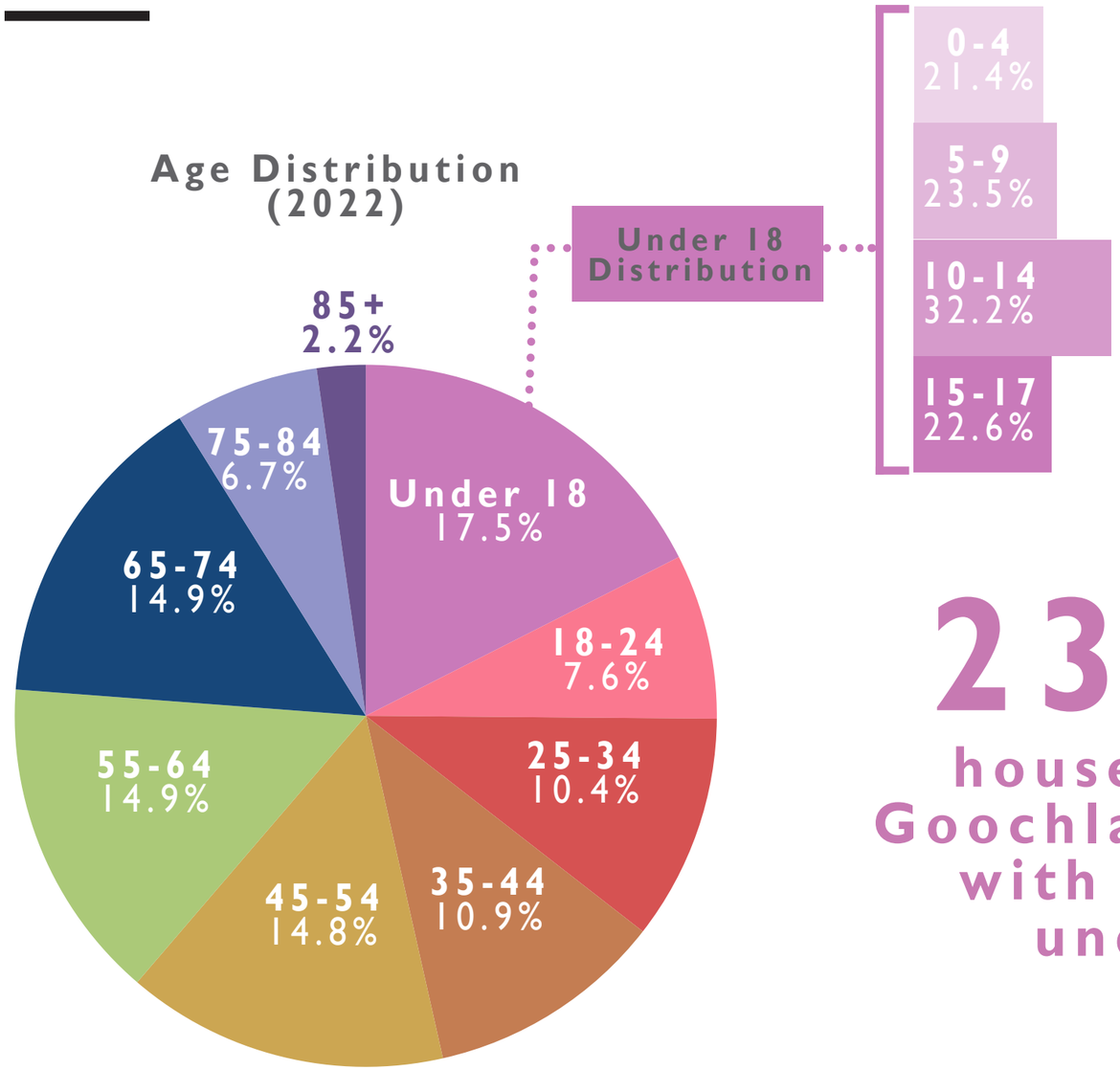
The SIS study area is served by Randolph Elementary School, Goochland Middle School, and Goochland High School. For the 2023-2024 school year, Randolph Elementary School had an enrollment of 457 students, Goochland Middle School 599 students, and Goochland High School 847 students.

Enrollment at Randolph Elementary dropped to 387 students (450 student capacity) for the 2024-2025 school year after a redistricting effort. The school currently has room for 63 additional students.



EXISTING CONDITIONS: SCHOOLS

Children & Schools (as of 2023)



23.5%

households in Goochland County with children under 18

BYRD ELEMENTARY SCHOOL

312 students
Built 1958

GOOCHLAND ELEMENTARY SCHOOL

357 students
Built 2024

RANDOLPH ELEMENTARY SCHOOL

457 students
Built 1958

GOOCHLAND MIDDLE SCHOOL

599 students
Built 2008

GOOCHLAND HIGH SCHOOL

847 students
Built 2001

**Goochland County Public Schools underwent redistricting in 2024. Numbers above do not reflect this redistricting.*

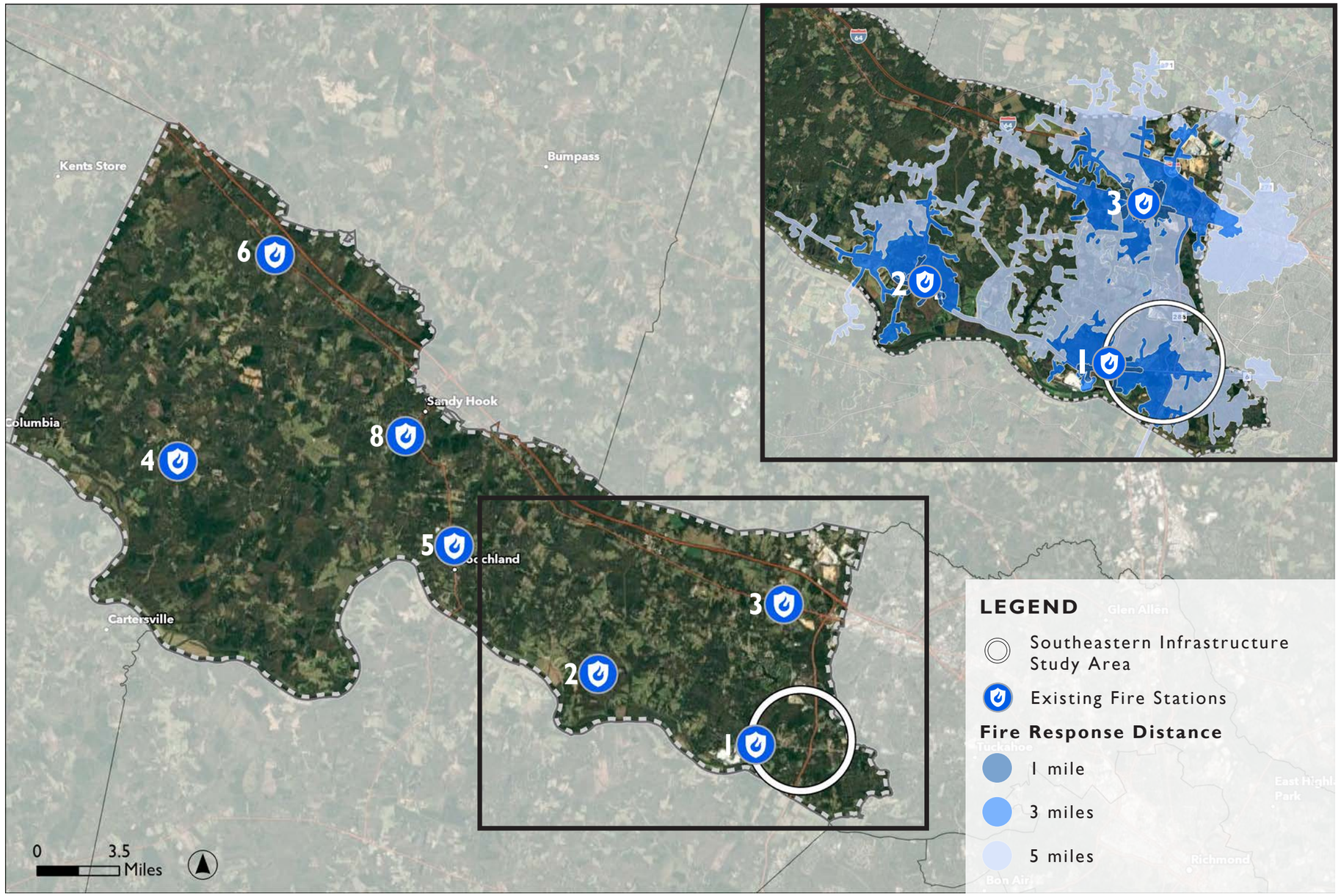
EXISTING CONDITIONS: FIRE-RESCUE

Existing Fire-Rescue

There are currently 6 fire-rescue stations in Goochland [Manakin (Station 1), Crozier (Station 2), Centerville (Station 3), Fife (Station 4), Courthouse (Station 5), and Hadensville (Station 6)]. Within the study area:

Station 1 – Manakin is located on Patterson Avenue near the intersection with Manakin Road and is the existing fire station which services the SIS area. Secondary response to the SIS area is from the Centerville Station 3 which is located on Broad Street at the intersection with the Broadview Shopping Center.

The inset map shows the 1, 3, and 5 mile response distances for the SIS study area. An additional fire-rescue station (West Creek/ Station 7) was planned for the Hockett Road area and would service SIS parcels. The County is currently evaluating sites to relocate the new station and no timetable is available for the construction. Fire Station 8 (Sandy Hook area) is currently under design to service the central portion of the County.



EXISTING CONDITIONS: WATER/SEWER

Water/Sewer Capacity

The SIS area is serviced by the Eastern Goochland Water and Wastewater Systems which operate under usage agreements with Henrico County and the City of Richmond. The water system currently has a usage of 800,000 gallons per day with an overall capacity of 5.25 million gallons per day. The wastewater system currently uses 500,000 gallons per day and has an overall capacity of 5 million gallons per day with the ability to increase that to 15 million gallons per day with an update to the Water/ Wastewater Treatment Plant.

EXISTING CONDITIONS: WATER/SEWER

Water/Sewer Capacity

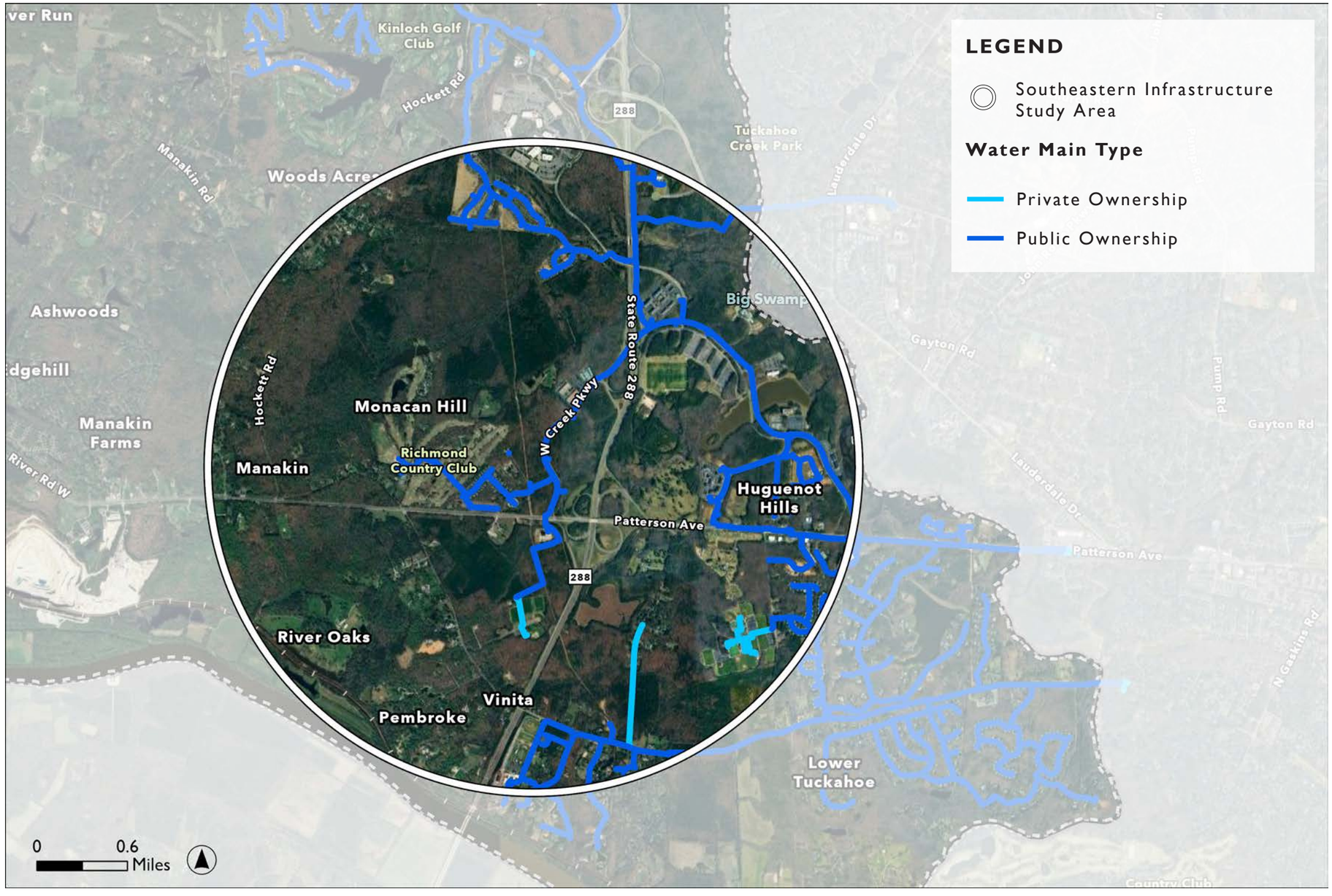
Tuckahoe Creek Service District

While overall capacity for both water and wastewater is abundantly available in the SIS area, the infrastructure lines to extend those services are provided via the Tuckahoe Creek Service District (TCSD).

The TCSD was created in 2002 to provide water and sewer services to the area and provide a mechanism for payment for those services and debt payment. Within the SIS area, the TCSD generally provides for water/sewer services north of Patterson Avenue.

There are limited to no water/sewer lines south of Patterson Avenue.

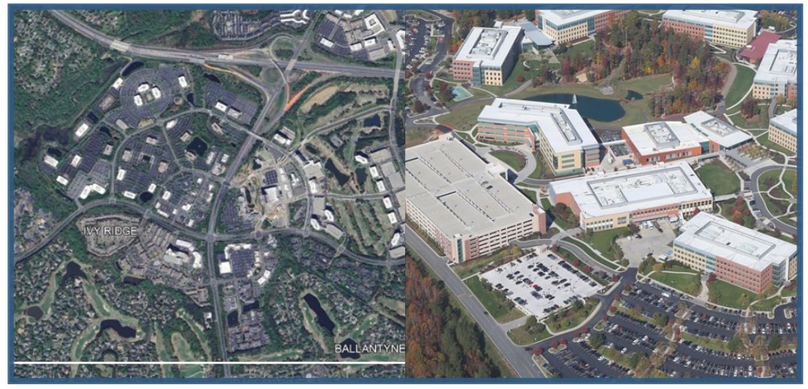
The adjacent map indicates the location of the existing water and sewer lines in the study area and includes all public and privately owned facilities.



V. SCENARIO OUTPUTS

Which scenarios were evaluated?

As indicated above, the SIS study analyzed three distinct development scenarios to determine the impact on the County's infrastructure. All analysis assumes 90% buildout of each scenario.



*A **Comprehensive Plan**-based scenario, which serves as a sort of "trends extended" scenario, effectively mimicking existing development patterns for future land use.*

*A **Mixed Use**-leaning scenario, which combines general commercial development with more housing and retail to create a future development pattern amenable to living, working, and congregating in the area.*

*An **Economic Development**-leaning scenario, which assigns more land to commercial uses consistent with Goochland policy and market trends.*

SIS OUTPUT METRICS: ALL RESULTS			
Metric	**Comp. Plan Scenario** *(90% Buildout)*	**Mixed-Use Scenario** *(90% Buildout)*	**Econ. Dev. Scenario** *(90% Buildout)*
Sq. Ft. Commercial Development	4.3m sf	2.5m sf *(see next pg)*	4.3m sf *(see next pg)*
New Single Family Homes	110 homes	660 homes	220 homes
New Multifamily Homes	0 homes	2,130 homes	770 homes
Average Daily Car Trips	28,300 trips	93,690 trips	67,980 trips
Additional Vehicles/Day Over Existing Capacity	8,300 vehicles	73,690 vehicles	47,980 vehicles
Additional Lanes Needed	2 lanes	6-8 lanes	4-6 lanes
Gallons/Day of Water	231,000 GPD	977,000 GPD	750,000 GPD
Gallons/Day of Sewer	218,000 GPD	636,000 GPD	608,000 GPD
Additional Water/Sewer Capacity Needed	*Will need to plan for the extension of lines to serve land bays as they develop.*		
New Students	40 students	250 students	80 students
New Classrooms Needed	3 classrooms	14 classrooms	5 classrooms
Sq. Ft. Fire & Rescue Facility Needs	1 new facility	1 new facility	1 new facility
Additional Sq. Ft. Fire & Rescue Facility Needed	No	Yes	No
Annual Tax Revenue	$6.3m	$3.9m	$12m

Figures are in addition to existing capacity.

SCENARIO OUTPUTS: DEVELOPMENT

What are the development assumptions for each scenario?

OUTPUTS BY DEVELOPMENT TYPE			
Metric	**Comp. Plan Scenario** *(90% Buildout)*	**Mixed-Use Scenario** *(90% Buildout)*	**Econ. Dev. Scenario** *(90% Buildout)*
Sq. Ft. Commercial Development	**4.3m sf**	**2.5m sf** *(see next pg)*	**4.3m sf** *(see next pg)*
New Single Family Homes	**110 homes**	**660 homes**	**220 homes**
New Multifamily Homes	**0 homes**	**2,130 homes**	**770 homes**

Figures are in addition to existing capacity.

Comprehensive Plan Scenario

At full buildout, the Comprehensive Plan based scenario will result in 4.3 million square feet of commercial development and 110 single family residential units.

Mixed-Use Scenario

Full buildout of the mixed-use leaning scenario will result in 2.5 million square feet of commercial development, 660 single family residential units, and 2,130 multi-family residential units.

Economic Development Scenario

Full buildout of the economic development-leaning scenario will result in 4.3 million square feet of commercial development, 220 single family residential units, and 770 multi-family residential units.

SCENARIO OUTPUTS: DEVELOPMENT

What are the development assumptions for each scenario by land use category?

Scenario	NON-RESIDENTIAL LAND USE CATEGORIES BY SQUARE FOOTAGE				RESIDENTIAL LAND USE CATEGORIES BY # OF UNITS	
	Recreation/ Open	Retail	Office	Industrial	Single Family	Multifamily
Mixed-Use	**5,436** sf **0.2%** of all non-residential sf	**990,479** sf **39%** of all non-residential sf	**338,554** sf **13%** of all non-residential sf	**1,179,119** sf **47%** of all non-residential sf	**660** units **24%** of all new units	**2,130** units **77%** of all new units
Economic Development	**2,235** sf **0.05%** of all non-residential sf	**592,701** sf **14%** of all non-residential sf	**429,095** sf **8%** of all non-residential sf	**4,349,398** sf **81%** of all non-residential sf	**250** units **25%** of all new units	**750** units **75%** of all new units

**Comprehensive Plan Scenario is not calculated since it's not broken down by land use types.*

SCENARIO OUTPUTS: DEVELOPMENT

What are the development assumptions for each scenario by specific land use?

COMMERCIAL DEVELOPMENT TYPES BY SQUARE FOOTAGE								
Scenario	**Flex Office/ Warehouse**	**Suburban Office Park**	**Adv. Manufacturing**	**Data Center**	**Retail**	**Medical**	**Recreation/ Open**	**Distribution**
Mixed-Use	**856,846** sf **34%** of all commercial sf	**16,281** sf **1%** of all commercial sf	**322,273** sf **13%** of all commercial sf	**0** sf **0%** of all commercial sf	**990,479** sf **39%** of all commercial sf	**322,273** sf **13%** of all commercial sf	**5,436** sf **0.2%** of all commercial sf	**0** sf **0%** of all commercial sf
Economic Development	**392,239** sf **9%** of all commercial sf	**27,135** sf **1%** of all commercial sf	**1,663,273** s **39%** of all commercial sf	**754,102** sf **18%** of all commercial sf	**592,701** sf **14%** of all commercial sf	**401,960** sf **9%** of all commercial sf	**2,235** sf **0.05%** of all commercial sf	**441,817** sf **10%** of all commercial sf

RESIDENTIAL DEVELOPMENT TYPES BY # OF UNITS			
Scenario	**Single Family - Well & Septic**	**Single Family - Utilities**	**Multifamily**
Mixed-Use	**75** units **3%** of all new units	**585** units **21%** of all new units	**2,130** units **77%** of all new units
Economic Development	**75** units **8%** of all new units	**175** units **17%** of all new units	**750** units **75%** of all new units

**Comprehensive Plan Scenario is not calculated since it's not broken down by land use types.*

SCENARIO OUTPUTS: ROADWAYS

What are the potential demands on the roadways?

ROADWAYS OUTPUTS			
Metric	**Comp. Plan Scenario** *(90% Buildout)*	**Mixed-Use Scenario** *(90% Buildout)*	**Econ. Dev. Scenario** *(90% Buildout)*
Average Daily Car Trips	**28,300 trips**	**93,690 trips**	**67,980 trips**
Additional Vehicles/Day Over Existing Capacity	**8,300 vehicles**	**73,690 vehicles**	**47,980 vehicles**
Additional Lanes Needed	**2 lanes**	**6-8 lanes**	**4-6 lanes**

Figures are in addition to existing capacity. A roadway can generally accommodate 10,000 to 12,000 vehicles per day for each two lane section.

Comprehensive Plan Scenario

The comprehensive plan scenario will result in an additional 28,300 vehicles per day on the roadways within the SIS area. The additional traffic will result in an excess of 8,300 vehicles per day over the existing capacity of the roadways. To accommodate the comprehensive plan growth, an additional 2 lanes of operating capacity will be needed.

Mixed-Use Scenario

The mixed-use leaning scenario will result in an additional 93,690 vehicles per day on the roadways within the SIS area. The additional traffic will result in an excess of 73,690 vehicles per day over the existing capacity of the roadways. To accommodate the comprehensive plan growth, an additional 6-8 lanes of operating capacity will be needed.

Economic Development Scenario

The economic development leaning scenario will result in an additional 67,980 vehicles per day on the roadways within the SIS area. The additional traffic will result in an excess of 47,980 vehicles per day over the existing capacity of the roadways. To accommodate the comprehensive plan growth, an additional 4-6 lanes of operating capacity will be needed.

SCENARIO OUTPUTS: SCHOOLS

What are the potential demands on public schools?

SCHOOLS OUTPUTS			
Metric	**Comp. Plan Scenario** *(90% Buildout)*	**Mixed-Use Scenario** *(90% Buildout)*	**Econ. Dev. Scenario** *(90% Buildout)*
New Students	**40 students**	**250 students**	**80 students**
New Classrooms Needed	**3 classrooms**	**14 classrooms**	**5 classrooms**

Figures are in addition to existing capacity.

Comprehensive Plan Scenario

The comprehensive plan scenario will result in an additional 40 students (3 classrooms) across Randolph Elementary School, Goochland Middle School, and Goochland High School.

Mixed-Use Scenario

The mixed-use leaning scenario will result in an additional 250 students (14 classrooms) across Randolph Elementary School, Goochland Middle School, and Goochland High School.

Economic Development Scenario

The economic development leaning scenario will result in an additional 80 students (3 classrooms) across Randolph Elementary School, Goochland Middle School, and Goochland High School.

SCENARIO OUTPUTS: FIRE-RESCUE

What are the potential demands on fire-rescue?

FIRE-RESCUE OUTPUTS			
Metric	**Comp. Plan Scenario** *(90% Buildout)*	**Mixed-Use Scenario** *(90% Buildout)*	**Econ. Dev. Scenario** *(90% Buildout)*
Sq. Ft. Fire & Rescue Facility Needs	1 new facility	1 new facility+	1 new facility
Additional Sq. Ft. Fire & Rescue Facility Needed	No	Yes	No

Figures are in addition to existing capacity.

Comprehensive Plan Scenario

The comprehensive plan scenario will result in an additional need of one new facility in the area (West Creek Station).

Mixed-Use Scenario

The mixed-use leaning scenario will result in an additional need of one new facility in the area (West Creek Station) plus additional capacity (in addition to West Creek Station or new facility).

Economic Development Scenario

The economic development leaning scenario will result in an additional need of one new facility in the area (West Creek Station).

SCENARIO OUTPUTS: WATER/SEWER

What are the potential demands on water and sewer infrastructure?

WATER AND SEWER OUTPUTS			
Metric	**Comp. Plan Scenario** *(90% Buildout)*	**Mixed-Use Scenario** *(90% Buildout)*	**Econ. Dev. Scenario** *(90% Buildout)*
Gallons/Day of Water	**231,000 GPD**	**977,000 GPD**	**750,000 GPD**
Gallons/Day of Sewer	**218,000 GPD**	**636,000 GPD**	**608,000 GPD**
Additional Water/Sewer Capacity Needed	***Will need to plan for the extension of lines to serve land bays as they develop.***		

Figures are in addition to existing capacity.

Comprehensive Plan Scenario

The comprehensive plan scenario will result in an additional 231,000 gallons per day of water use and an additional 218,000 gallons per day of sewer use. No additional water/sewer capacity is needed but the extension of water/sewer lines will be required.

Mixed-Use Scenario

The mixed-use leaning scenario will result in an additional 977,000 gallons per day of water use and an additional 636,000 gallons per day of sewer use. No additional water/sewer capacity is needed but the extension of water/sewer lines will be required.

Economic Development Scenario

The economic development leaning scenario will result in an additional 750,000 gallons per day of water use and an additional 608,000 gallons per day of sewer use. No additional water/sewer capacity is needed but the extension of water/sewer lines will be required.

SCENARIO OUTPUTS: WATER/SEWER

What are the potential demands on water and sewer infrastructure?

The Utility Master Plan and the 2024 Storage Evaluation (performed by Dewberry) evaluated the demand for both water and sewer in the year 2045 and contained demand assumptions for future uses. All of the demand assumptions within the SIS scenarios are less than what was evaluated in the Utility Master Plan.

The Utility Master Plan identified water system improvements in the development area for 2025 (i.e. current storage is not sufficient regardless of development scenario). The improvements are identified in the following table. No other water system improvements are anticipated before 2045. The Utility Master Plan does not anticipate any sewer improvements in the area before 2045.

Improvement Name	Project Type	Improvement Year	Budget Estimate
Tuckahoe Creek	Water Main	2025	$1,340,000
Ridgefield BPSV	Control Valve	2025	$300,000
West Creek Control Valve	Control Valve	2025	$300,000
Ridgefield BPS	Booster Pump Station	2025	$8,500,000
Ridgefield GST	Ground Storage Tank	2025	$2,000,000
Total Improvement Cost			$12,440,000

SCENARIO OUTPUTS: TAX BASE

What are the potential outputs for the tax base?

TAX BASE OUTPUTS			
Metric	**Comp. Plan Scenario** *(90% Buildout)*	**Mixed-Use Scenario** *(90% Buildout)*	**Econ. Dev. Scenario** *(90% Buildout)*
Annual Tax Revenue	**$6.3m**	**$3.9m**	**$12m**

Figures are in addition to existing capacity. All information is based on 2024 County Assessor data.

Comprehensive Plan Scenario

When fully built, it is estimated the comprehensive plan scenario will result in an annual tax revenue of $6.3 million to the County.

Mixed-Use Scenario

When fully built, it is estimated the mixed-use leaning scenario will result in an annual tax revenue of $3.9 million to the County.

Economic Development Scenario

When fully built, it is estimated the economic development leaning scenario will result in an annual tax revenue of $12 million to the County.

COST ESTIMATES

Metric	Size	Total Planning Level Cost	Comp. Plan Scenario		Mixed-Use Scenario		Econ. Dev. Scenario	
			Need	*Cost*	*Need*	*Cost*	*Need*	*Cost*
			Roadway					
2 Lanes of Additional Roadway Capacity	13,600 LF[1]	$1,900/LF[2]	2 lanes	$25.8M	6 lanes 8 lanes	$77.5M $103.4M	4 lanes 6 lanes	$51.7M $77.5M
			Water/Sewer					
Water System Improvements	See text	$12.4M[3]	-	$12.4M[3]	-	$12.4M[3]	-	$12.4M[3]
Sewer Improvements	None	-	-	-	-	-	-	-
			Schools					
Elementary School[4]	450 students	$50M	40 students	-	250 students	$50M	80 students	$50M
			Fire and Rescue					
New Fire Station[5]	15,000 SF	$13M	1 new facility	$13M	1 new facility+	$13M+	1 new facility	$13M
Total Scenario Cost	-	-	-	$51M	-	$153M - $178M+	-	$127M - $153M

(1) Length is Route 6 from Hockett to Blair and is representative only
(2) VEDP Study and recent roadway projects cost/lf
(3) Initial improvements identified by the Goochland County Utility Master Plan regardless of development scenario
(4) Recent area bids including Goochland ES for 750-1,000 students with average cost of $56M
(5) Per Goochland County Fire

COMPARABLES

GOOCHLAND COMPARISON COUNTIES							
County	2022 Population	Pop./ Sq. Mi.	Pop./Bus. Establishments.	Growth '10-'20	Median HH Income	Primary City	Distance to City Center
Goochland, VA	**24,727**	**88**	**35**	**14%**	**$105,600**	**Richmond, VA**	**15 miles**
Monroe, GA	27,957	71	49	6%	$74,867	Macon, GA	10 miles
Bastrop, TX	97,216	109	63	31%	$76,522	Austin, TX	15 miles
Lincoln, NC	86,810	293	45	11%	$77,776	Charlotte, NC	15 miles
Geauga, OH	95,397	238	35	2%	$99,305	Cleveland, OH	15 miles
Fauquier, VA	72,972	113	38	12%	$110,358	Washington DC	35 miles
New Kent, VA	22,945	109	54	25%	$113,120	Richmond, VA	15 miles
Nassau, FL	90,352	139	44	23%	$90,671	Jacksonville, FL	15 miles
Wise, TX	68,632	76	48	16%	$91,920	Forth Worth, TX	25 miles
Boone, IN	70,812	167	41	25%	$103,592	Indianapolis, IN	15 miles
Currituck, NC	28,100	107	41	19%	$82,793	Norfolk, VA	20 miles
Oldham, KY	67,607	362	52	12%	$119,553	Louisville, KY	15 miles
Walton, GA	96,673	296	51	15%	$77,346	Atlanta, GA	30 miles

COMPARABLES

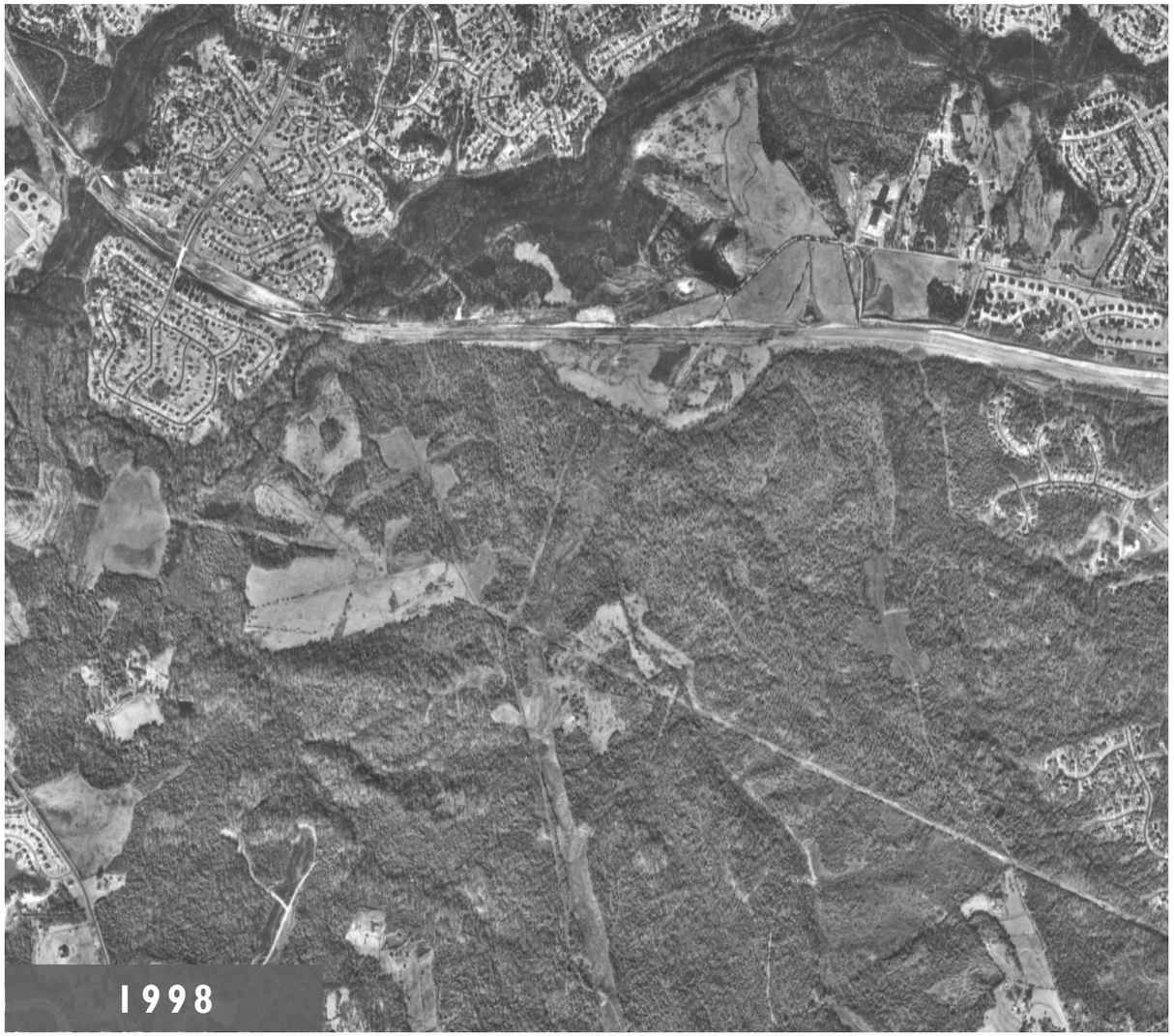
Comprehensive Plan Scenario Comparable: Ballantyne Corporate Park, Charlotte, NC

- 11 Miles from Charlotte
- 2,000 Acres
- 4M S.F. Class A office
- Resort Hotel and Conference Center
- Retail/Restaurants
- Golf
- Multifamily Housing

2022 Master Plan by Sasaki

COMPARABLES

Comprehensive Plan Scenario Comparable: Ballantyne Corporate Park, Charlotte, NC



COMPARABLES

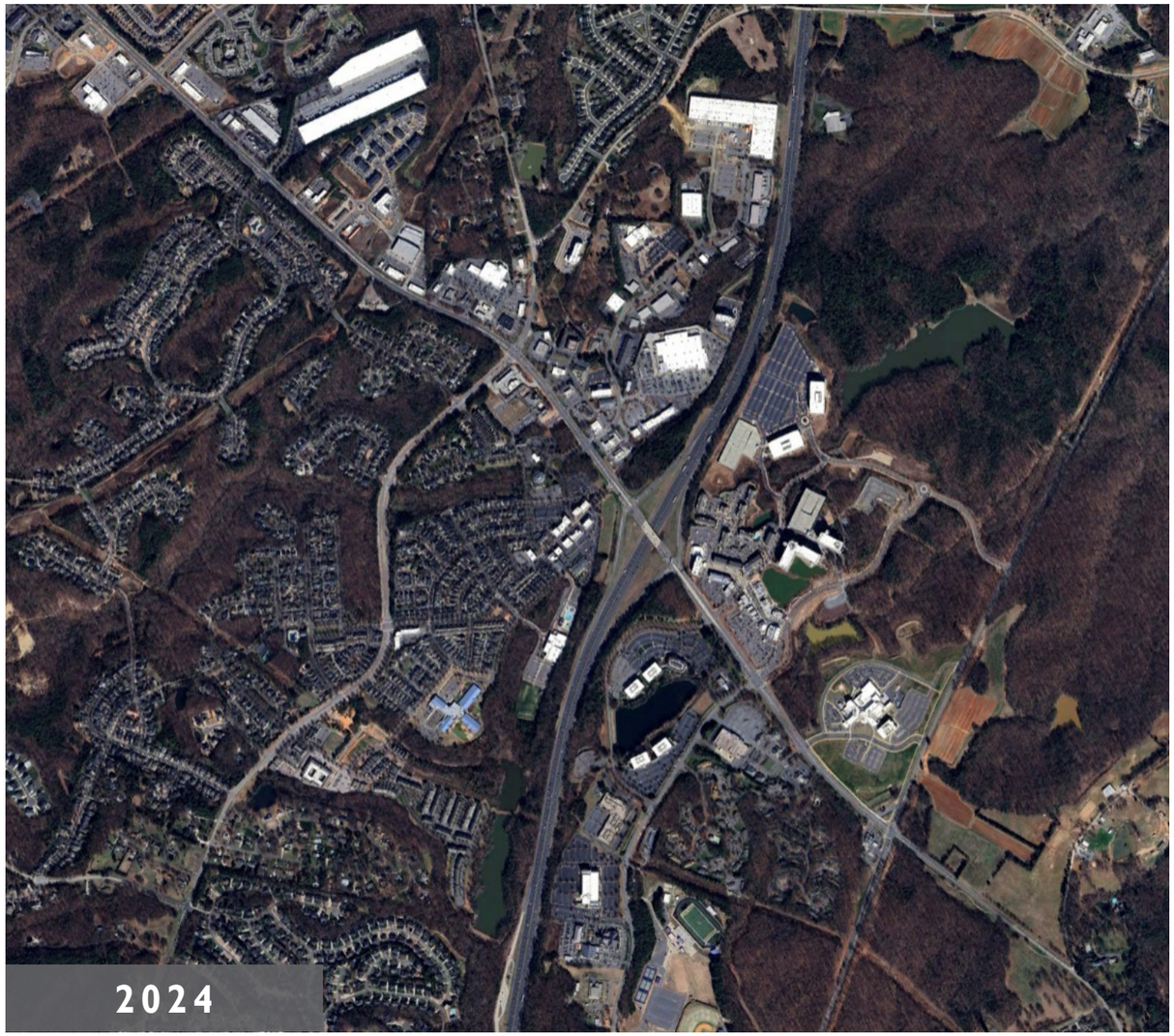
Mixed-Use Scenario Comparable: Fort Mill, York County, SC

- Baxter Village, Kingsley Office/ Town Center
- 20 miles to Charlotte
- 400,000 S.F. Retail
- 500,000 S.F Office (Kingsley Park)
- 1,450 Homes
- YMCA
- Public Library
- Elementary School
- 500 Acres Open Space

2014 Master Plan by LandDesign

COMPARABLES

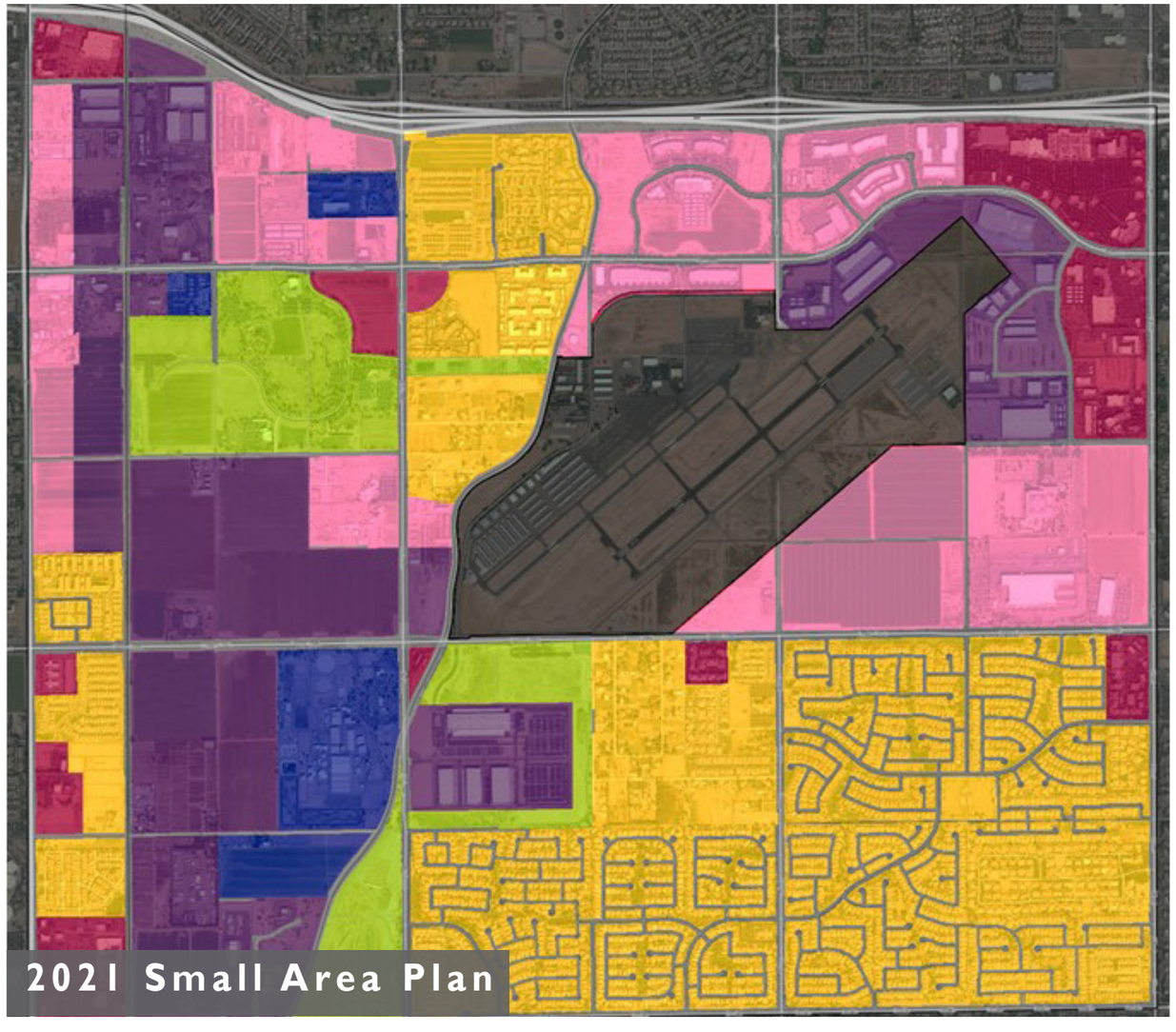
Mixed-Use Scenario Comparable: Fort Mill, York County, SC



COMPARABLES

Economic Development Scenario Comparable: Chandler Airpark, Chandler, AZ

- 15 miles to Phoenix
- Innovation District
- Commercial-Office District
- Industrial District
- Residential District
- Municipal District
- Parks and Open Space



2021 Small Area Plan

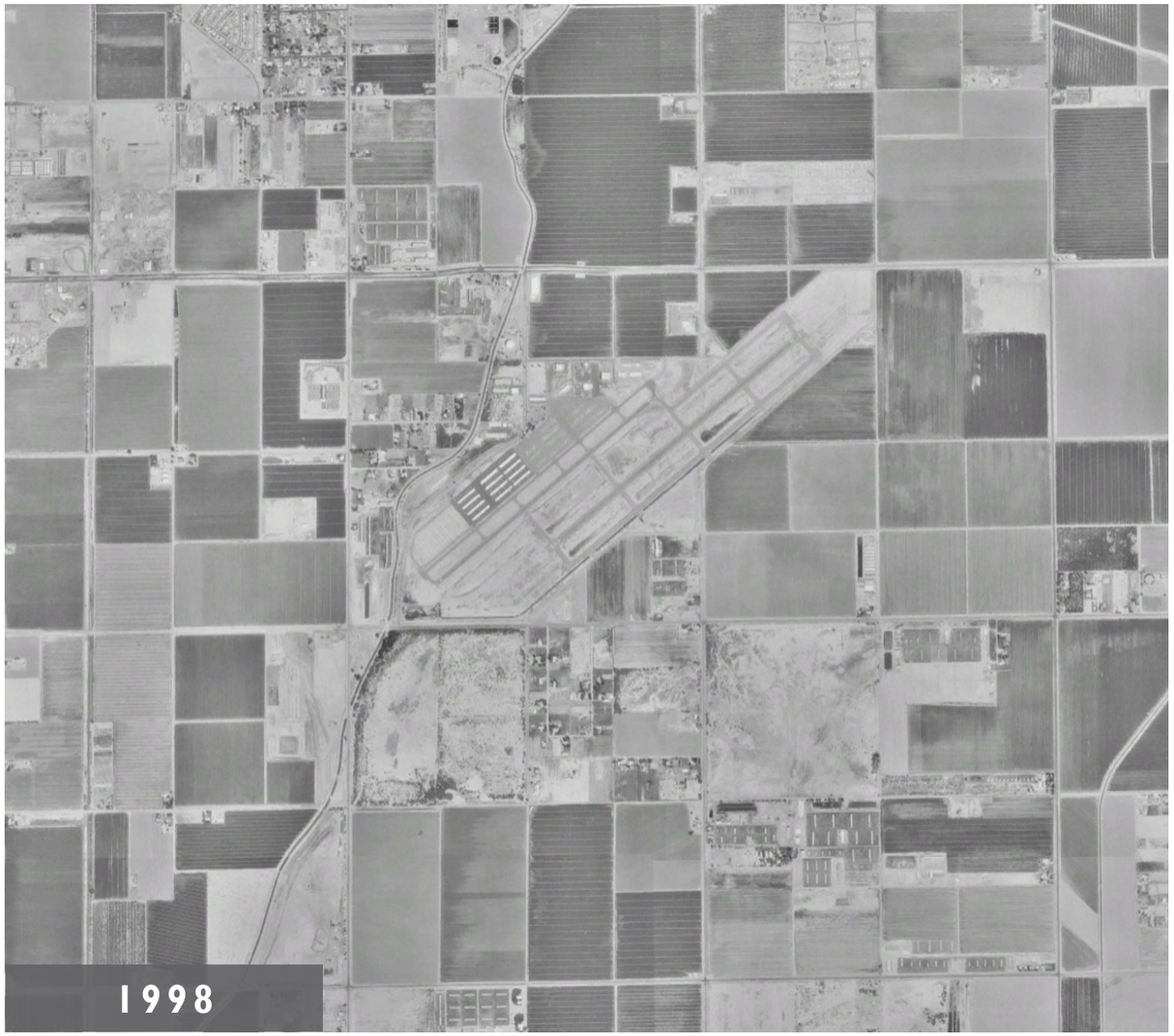
Airpark Area Land Use Element

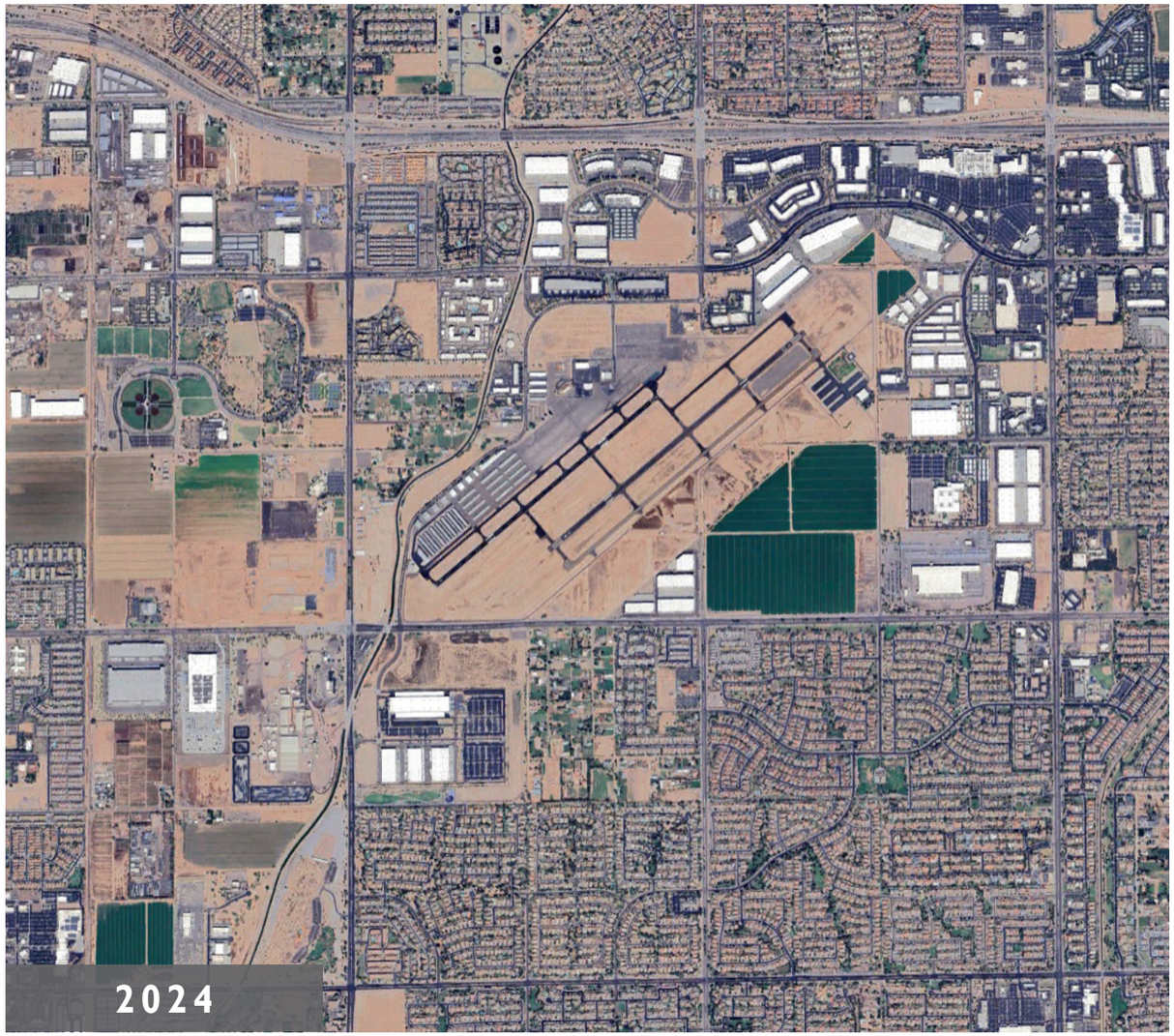
The Airpark Area Land Use Plan map identifies six types of land use districts appropriate to the Airpark Area:

- Innovation District
- Commercial-Office District
- Industrial District
- Residential District
- Municipal District
- Parks & Open Space District

COMPARABLES

Economic Development Scenario Comparable: Chandler Airpark, Chandler, AZ





VI. RECOMMENDATIONS

Southeastern Infrastructure Recommendations

As a result of this analysis, the following recommendations are offered to support Goochland County's long range planning efforts.

Land Use

- The County should consider undertaking a Comprehensive Plan update for the area to identify the land uses most desirable and beneficial for the County.
- The County should consider undertaking a high-level analysis of the differentiated and unanticipated consequences that uses may create for County infrastructure and services. During the SIS study, it was noted that age-restricted communities have a notable impact on demand for Fire-Rescue services. This type of impact is outside of typical land use analysis. A deeper understanding of these impacts would provide for higher quality land use and facilities planning.
- Any development within the SIS area should be reviewed at a high level to analyze if the impacts are in line with expected impacts.
- The County should consider employing a SIS-type analysis when it embarks on other land use studies.
- Results for the Comprehensive Plan Scenario should be used on departmental master plan updates for SIS area until such time as the Land Use Plan is updated by the Board of Supervisors.

Transportation

- The County should plan for an additional 2 to 8 travel lanes within the study area through an update to the Major Thoroughfare Plan (MTP).
- New roadways (planned and constructed) should provide interconnectivity to all parcels and land-bays within the study area.
- The MTP update should build upon principles established in the current MTP such as limiting Hockett Road to two lanes with safety and intersection improvements.
- The intersection of Patterson Avenue and River Road has an existing crash history and should be evaluated for safety improvement.

Water and Sewer

- Water and sewer lines will need to be extended to parcels comprising the land bays. The County should evaluate the feasibility of extending the utility lines.

Schools

- The County should begin to plan for 3-14 new classrooms.
- While enrollment at Randolph Elementary School dropped after a redistricting in the 2024-25 SY and is currently within capacity, two of the scenarios (Mixed Use, Economic Development) would push it beyond capacity. If these scenarios are realized, the County should begin planning for a replacement to the school.
- Additional classrooms will also require teachers, service personnel, and supplies.

Fire and Rescue

- The new West Creek Fire-Rescue station planned for the area will be needed and a location/design should be planned for in the immediate future.
- Should the mixed-use scenario be developed, additional capacity may be needed.
- The additional fire and rescue facilities will also require full-time emergency personnel, equipment, and supplies.

Capital Facilities Planning

- Review capital facilities plan to make sure development standards are keeping pace with agency requirements, such as the Fire Department Master Plan.
- Study other capital facility needs for this area, such as a County Park or remote Sheriff facilities.

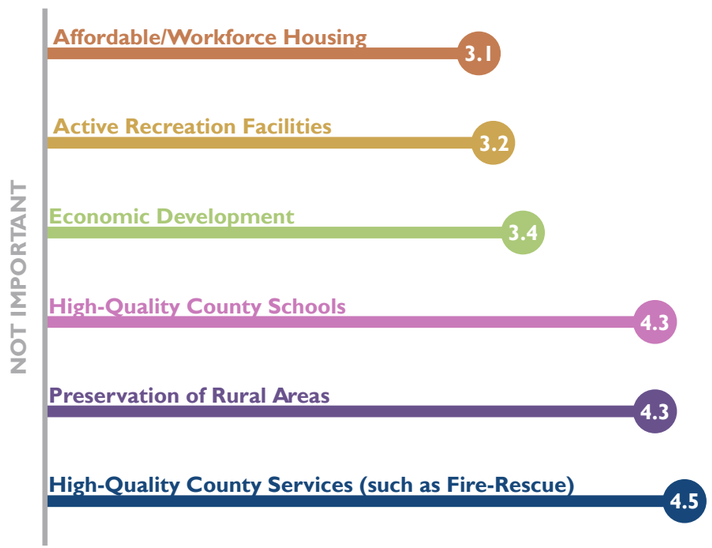
APPENDIX A: PUBLIC ENGAGEMENT

Public Meeting 1

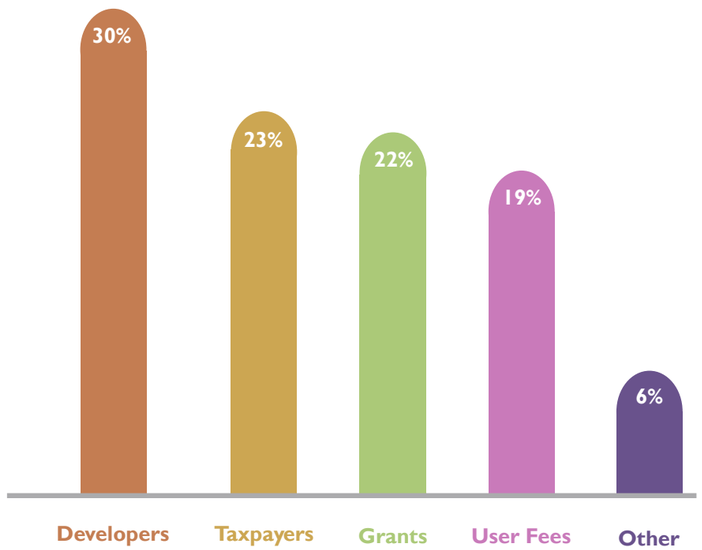
The initial public meeting for the Southeastern Infrastructure Study was held on March 26, 2024 at 6:00 pm at Hope Church (12445 Patterson Ave., Richmond, VA). A survey was conducted using the online Mentimeter survey platform with approximately 40 individual respondents to the questions.

About 80% of the County's revenue comes from residential land use and 20% from commercial. How important is increasing the commercial share?

How important are the following?



Who should fund the infrastructure improvements? (Select all that apply)

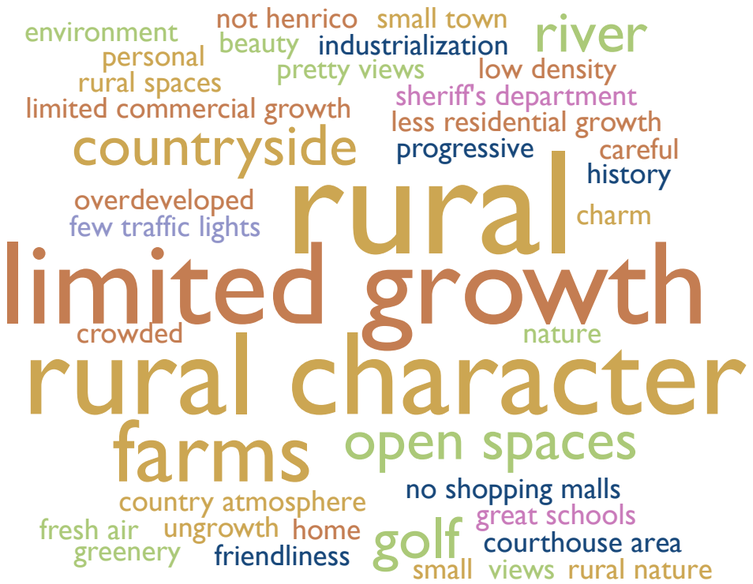


There are many ways this study can measure impacts of development in the study area. Sort the measures by order of importance.

PUBLIC ENGAGEMENT

Public Meeting 1

What is one thing about Goochland County that you hope never changes?



What other measures of the impacts of new development should be considered?

What is the greatest infrastructure concern you have for the study area?

Public Meeting 2

The second public meeting was held on September 10, 2024 again at 6pm at Hope Church. The results of the study were presented to the public and was followed by a question and answer time and an open house.