SECTION 16.14 ~~TRAFFIC~~ TRANSPORTATION IMPACT ANALYSIS (TIA)

~~Traffic~~ Transportation impacts, and how to mitigate them, are an important consideration for our community when a significant development is proposed. Public policy makers, citizens and developers all have a stake in understanding and responding to additional demands on the transportation system. A ~~Traffic~~ Transportation Impact Analysis (TIA) is a tool used to evaluate the incremental impacts on the surrounding transportation infrastructure and how to mitigate them to maintain safe traffic and transportation operations.

A. TIA Determination: The Planning Director or his/her designee shall determine the need for a TIA upon receipt of a development application accompanied by a sketch or schematic plan. If warranted, the transportation consultant assigned by the city shall prepare the TIA. At the discretion of the North Carolina Department of Transportation (NCDOT) and the City, a ~~t~~Transportation ~~t~~Technical ~~m~~Memorandum (TTM), in lieu of a full TIA report, may be allowed for some developments. If proposed street connections are not consistent with adopted plans, then an explanation or proposed transportation mitigation alternative that is equal or better shall be discussed in the study. NCDOT and the City will be responsible for determining whether the alternative mitigation plan meets and/or exceeds the performance standards of the proposed street connections in the adopted plans.

B. Minimum Thresholds for TIAs: A TIA will be required to accompany the development plan when expected gross trip generation is **1000 total trips or more both entering and exiting the site in a 24-hour period, and/or 100 total trips both entering and exiting the site during either the am or pm peak (prior to any trip reductions applied- see Section G (8)).** Because of the limited arterial roadway network, developments proposed in the South Point Peninsula Area (south of the intersection at Nixon/RL Stowe Roads and South Point Road - See Figure 1) are required to complete a TTM when expected gross trip generation of 500 total trips or more both entering and exiting the site in a 24-hour period, and/or 50 total trips both entering and exiting the site during either the AM or PM peak.

C. The gross trip generation will be calculated by the City based on information (proposed project summary and development plan) provided by the applicant and the final determination for requiring the TIA will be by the Planning Director. The Planning Director or his/her designee may also determine the need for a TIA or Transportation Technical ~~m~~Memorandum (TTM) based on special circumstances associated with the development, even if the gross trips falls below this threshold. This may be due to location, an intersection or thoroughfare nearby that is at or above capacity, the nature of the use, or one of the following:

1. Traffic generated from a non-residential development that could potentially significantly impact adjacent residential neighborhoods.
2. Traffic operation problems for current and/or future years on nearby streets are expected to be significantly aggravated by traffic generated from the proposed new development.
3. Major and minor thoroughfares near the site are experiencing noticeable delays
4. Traffic safety issues exist at the intersection or street that would serve the proposed new development.
5. The proposed land use differs significantly from the adopted Comprehensive Land Use Plan for the City.
6. The internal street or access system is not anticipated to accommodate the expected traffic generation.
7. The proposed development project includes a drive through facility, or other uses such as schools that require significant on-site circulation that may have an off-site impact to adjoining roads and/or intersection.

8. The amount and/or character of traffic is significantly different from a previously approved TIA, or more than 24 months have passed since completion of previous TIA.

D. Scoping Meeting – A mandatory scoping meeting is required prior to beginning the TIA or TTM to discuss the requirements and strategies for a TIA/TTM specific to the site and the proposed development. Background information shall be submitted by the applicant five or more business days prior to the scoping meeting and shall include a conceptual site plan showing proposed access points, proposed land use and densities, structure and parking envelopes. The City, the transportation consultant assigned by the City, and the applicant(s) are required to attend the mandatory scoping meeting and the NCDOT district staff will be invited and encouraged to attend if access to a state road is involved. The applicant may invite members of his/her development team as needed.

E. Memorandum of Understanding (MOU) – An MOU, documenting the understood scope of the project, shall be prepared by the transportation consultant assigned by the City. The MOU shall be signed by the applicant and the City, and agreed upon by the NCDOT District Engineer if access to a state road is involved, before the consultant can begin work on the TIA. Failure by the applicant to provide accurate information or failure by the assigned transportation consultant to follow the MOU shall result in disapproval of the TIA. If significant changes are made to the scoping parameters documented in the MOU, a revised MOU will be required.

F. Fees – After the scoping meeting, the transportation consultant assigned by the City shall submit a summary of consultant fees for preparing the TIA (or TTM) to the City. Per the MOU, the applicant(s) shall agree to provide payment in full to the City for preparation of the TIA so that the City can release the work to the consultant. The City may require all or a portion of the estimated fees to be paid to the City prior to commencement of the work. Any additional services incurred by the transportation consultant in addition to the MOU must be approved by the City and agreed to and paid for by the applicant prior to performance of the additional work.

G. Transportation Mitigation Agreement (TMA) – Upon completion of the TIA or TTM, certain on or off-site transportation mitigation measures may be required as recommended by the TIA. If so, the transportation consultant assigned by the City shall prepare a Transportation Mitigation Agreement (TMA) which will summarize the following:

1. Development plan
2. Phasing and timing of development (if applicable)
3. Site access and points of ingress/egress
4. On and off-site improvements required to adequately mitigate the project impacts to the City's transportation system, including vehicular, pedestrian, and bicycle improvements.
5. Trigger points and deadlines for construction of any improvements.

The TMA must be signed by the applicant, City and the NCDOT District or Division Engineer if the mitigation involves a state roadway. All off-site ROW areas shall be acquired and dedicated prior to approval of construction documents, and required mitigation measures must be implemented prior to final Certificate of Occupancy (CO) as identified in the TIA phasing plan, or the applicant(s) shall provide ~~a cost estimate to the City for review and provide~~ a payment-in-lieu ~~for said measures prior to CO~~ in accordance with Section G (18).

H. TIA Outline and Contents – The outline and contents of what is required to be included in the TIA will be discussed at the scoping meeting and included in the MOU. A detailed summary of the expected content and methodologies to be used in the TIA is discussed below.

1. Cover/Signature page – Includes the project name, location, name of the applicant, contact information for the applicant, and date of the study. The name, contact information, registration number, signature, and seal of a duly qualified and registered professional engineer in the State of North Carolina are also required to appear on this page.
2. Table of Contents – Includes a list of all section headings, figures, tables, and appendices included in the TIA report. Page numbers shall denote the location of all information, excluding appendices, in the TIA report.

3. Executive Summary – Includes a description of the study findings, a general description of the project scope, study horizon years, probable transportation impacts of the project, and mitigation measure recommendations. Technical publications, calculations, documentation, data reporting, and detailed design shall not be included in this section.

4. Project Description – Includes a detailed description of the development, including the size of the parcel, development size, existing and proposed uses for the site, anticipated completion dates (including phasing). It shall also include the square footage of each use and/or the number and size of dwelling units proposed, and a map and copy of the site plan provided by the applicant(s).

5. Site Description – Includes a description of the project location within the City and region, existing zoning and use (and proposed use if applicable), and key physical characteristics of the site, including general terrain and environmentally sensitive or protected areas.

6. Site Access – A complete description of the ingress/egress of the site shall be explained and depicted. It shall include number of driveways, their locations, distances between driveways and intersections, access control (full-movement, leftover, right-in/right-out, etc.) types of driveways (two-way, one-way, etc.), traffic controls, etc. Internal streets (lanes, flow, and queuing), parking lots, sidewalks, bicycle lanes, and designated loading/unloading areas shall also be described. Similar information for adjacent properties, including topographic grade relationship, shall be provided to evaluate opportunities for internal connections. The design, number, and location of access points to collector and arterial roadways immediately adjacent to the site must be fully analyzed. The number of access points shall be kept to a minimum and designed to be consistent with the type of roadway facility. Driveways serving the site from state roads shall be designed in accordance with the NCDOT's Policy on Street and Driveway Access and/or the City standards, as applicable.

7. Study Area – The limits of the study area shall be based on the location, size and extent of the proposed project, and an understanding of existing and future land uses and traffic conditions surrounding the site. The limits of the study area for the TIA or TTM shall be reviewed and approved by the City and NCDOT staff at the mandatory scoping meeting. At a minimum, the study area shall include all ~~streets and~~ signalized intersections within a 1-mile radius of the proposed site unless otherwise noted by the Planning Director and/or where site traffic estimated for build-out of the project will constitute 10% or more of any signalized intersection approach during

the peak hour. Unsignalized intersections between the required signalized intersections will be added to the scope as directed by the City. To initially determine the impacts, the City will maintain a database of recent peak-hour intersection turning movement counts. The applicable intersection counts will be equated to current year baseline volumes. Based on the proposed development program submitted by the applicant, a preliminary trip generation analysis, distribution and assignment will be performed within the area surrounding the site and compared to the current year base volumes. Related impacts or current operational problems, may dictate that other intersections be included in the study area as determined by City staff and/or NCDOT staff. A narrative describing the study area shall identify the location of the proposed project in relation to the existing transportation system and list the specific study intersections and/or segments. Any unique transportation plans or policies applicable to the area (e.g., CATS bus service and future plans) shall be mentioned. A site location map shall be provided and shall identify natural features, major and minor roadways within the study area, study intersections, and a boundary of the site under consideration.

8. Existing Conditions – Shall include a narrative and map that represents AM and PM peak-hour turning-movement volumes for all intersections within the study area. Traffic volumes shall be 15-minute interval weekday turning-movement counts (Tuesday through Thursday), include heavy-vehicle, pedestrian and bicycle counts, and be no more than twelve months old. The required count timeframes are from 6:30-8:30 a.m. and 4:30-7:00 p.m. and shall be collected during periods of the year when local schools are in regular session; however, site-specific conditions may necessitate additional or different traffic counting hours and/or days depending on the development program and location within the City. These unique circumstances will be determined and directed by the City. For example, 12-hour turning movement counts shall be required to complete the analysis if a traffic signal warrant analysis is required as part of the TIA. The City will determine if additional peak hours or weekend analyses shall be included in the TIA at the mandatory scoping meeting. For example, if the development is nearby a school that significantly alters traffic volumes at times other than the peak hours described above, additional study hours will be required. ~~Traffic volumes shall also represent weeks that have no observed federal, state, or local holidays and periods of the year when local schools are in session.~~ The source of existing traffic volume information shall be explicitly stated (e.g., City counts, new counts collected by the applicant, NCDOT counts, etc.). If previous counts were obtained, only counts collected within the one year of the Scoping Meeting will be deemed acceptable. Summary sheets for existing turning movement counts shall be included in the appendix of the TIA report. A separate narrative and map shall be prepared to describe the characteristics of surrounding major roadways, including functional classification, number of lanes, posted speed limit, existing average daily traffic volumes, typical cross section, intersection control, and lineal distance between major roadways. Field notes for the existing conditions investigation may be included in the appendix of the TIA report.

9. Future Year Conditions – Unless otherwise approved by the City, future year conditions for a single-phase development shall be analyzed for the year the development is expected to be at full occupancy (build-out year) and five years after the build-out year (build-out + 5). For multiple-phased development, the scenarios shall be completed in order, with any improvements specified by development included in the subsequent build scenarios, including five years after the full build-out year (build-out + 5). Specific analysis periods to include in the study shall depend

greatly upon the development program, proposed project phasing plan, and significant improvements programmed for the surrounding transportation system. The approved offsite developments and transportation projects to be included in the base future-year background conditions for the transportation system within the study area shall be determined during the scoping meeting. Transportation improvements assumed in the future-year background conditions analysis may include those with an expected completion date concurrent with that of the development and funded through either by the City of Belmont, State of North Carolina Transportation Improvement Program, or indicated as a required condition of approval from another nearby development application. Only projects approved by the City at the scoping meeting may be included in the analysis as future existing infrastructure. Those improvements committed by other projects must be clearly identified in the report as approved offsite development road improvements. Adjacent development traffic information used in the development of the future year background traffic volumes shall be included in the appendix of the TIA report. Unfunded, planned infrastructure projects may be mentioned in the TIA, but the description shall specifically identify that these projects are not included in the background condition. Future year background traffic volumes shall be forecasted using historical growth rate information, regional models, and/or TIA reports for development approved by the City but not yet built. A narrative and map shall be prepared that presents turning movement volumes for each peak hour for all intersections identified within the study area. Future year base traffic volumes, other development volumes, and site traffic volumes shall be clearly separated and combined in the map.

10. Trip Generation – Base trip generation for the proposed land use(s) shall be calculated using data published in the latest version of the Institute of Transportation Engineers' (ITE) Trip Generation Manual. Data limitations, data age, choice of peak hour of adjacent street traffic, choice of independent variable, and choice of average rate versus equation shall be discussed at the mandatory scoping meeting. Local trip generation rates may be acceptable if appropriate validation is provided by the applicant to support them. Any deviation from ITE trip generation rates shall be discussed in the mandatory scoping meeting and documented in the MOU if approved by the City and NCDOT. The NCDOT Municipal School Transportation Assistance (MSTA) calculator shall be used to calculate projected trip generations for school sites.

    a. Internal Capture – Base trip generation may be reduced by rate of internal capture when two or more land uses are proposed using methodology recommended in the most current Trip Generation Handbook published by the ITE or research published by the National Cooperative Highway Research Program (NCHRP) Transportation Research Board. Reductions for internal capture shall be applied to multi- or mixed-use sites only, and reductions greater than 10% in any peak hour require consultation and acceptance by the City and NCDOT. The internal capture reduction shall be applied before pass-by trips are calculated.

    b. Pass-by Trips – Pass-by trips are those made as intermediate trips between an origin and primary destination (i.e., home to work, home to shopping, etc.). However, pass-by trips are not diverted from another roadway. Base trip generation may be reduced by rate of pass-by capture using methodology recommended in the most current Trip Generation Handbook published by the ITE. Pass-by trips associated with the development program may not

exceed 10% of the existing peak-hour volume reported for the adjacent public street network. This network shall include the streets that provide primary access to/from the site. For example, if a site access drive that connects to a low-volume local street, which its primary access to a major collector road, the traffic on the major collector shall be used as the adjacent street for pass-by calculation purposes. Evaluation of diverted trips may apply depending on the specifics of each site. A trip generation table shall summarize all trip generation calculations for the project.

11. Trip Distribution – External trip distribution shall be determined on a project-by-project basis using one of several sources of information available to transportation and land planning professionals. Potential sources for determining project trip distribution may include the regional travel demand model, market analysis, existing traffic patterns, or professional judgment. At the City's direction, multiple trip distributions may be required for differing land use types. Regardless of methodology, the procedures followed and logic for estimating trip distribution percentages must be well-documented in the TIA. Trip distribution percentages proposed for the surrounding transportation network shall be discussed during the scoping meeting and shall be approved by the City and NCDOT before proceeding with the TIA. A map showing the percentage of site traffic on each street included in the study area shall be included in the TIA.

12. Trip Assignment – Project traffic shall be distributed to the surrounding transportation system based on the site's trip generation estimates and trip distribution percentages. Future year build-out traffic forecasts (i.e., future year background traffic plus project traffic) shall be represented in graphic formats for AM and PM peak-hour conditions at all intersections included in the study area. If the project will be built in phases, traffic assignments shall be reported for each phase. Pass-by traffic shall be included at the driveways and access points for evaluating driveway volumes. Multiple assignment analyses may be required if the traffic control at the access drives varies (i.e., right-in/right-out vs. stop controlled vs. signalized).

13. Operations Analysis - Level-of-Service (LOS) and delay are the primary measures of effectiveness for impacts to the transportation system, and are defined by the most current edition of the Highway Capacity Manual (HCM). Operations analyses shall be performed for the existing and all future year scenarios. Impacts from the proposed project shall be measured by comparing the future year background conditions to the future year build-out conditions. Requirements for mitigation are described in Section G (17).

    a. Vehicle Capacity Analysis – ~~Level of Service (LOS) and delay is the primary measures of effectiveness for impacts to the transportation system, and is defined by the most current edition of the Highway Capacity Manual (HCM).~~ Unless otherwise noted, Synchro LOS and delay shall be reported for all signalized intersections and approaches identified in the study area. Based on HCM, LOS for unsignalized intersections is not defined as a whole; instead, only the individual stop-controlled or yield approaches shall be reported based on the HCM reports determined through the Synchro analysis. Existing signalized intersections shall be modeled based on existing signal timing plans provided by either the City or NCDOT. Existing signal timing plans shall be included in the appendix of the TIA report. If a traffic signal is part of a coordinated system it must be analyzed as such under all conditions.

Other standard practices and default input values for evaluating signalized intersections shall be consistent with the most recent guidelines published by the NCDOT, Traffic Engineering and Safety Systems Branch, Congestion Management Unit ("Capacity Analysis Guidelines"). The City may also require safety, traffic simulation, gap and/or other analyses appropriate for evaluating a development application. Additional analyses and/or traffic capacity or simulation tools (such as VISSIM) required for the TIA shall be identified during the scoping meeting. Capacity calculations shall be included for the existing and all future year scenarios, as described in Section G (19)). Impacts from the proposed project shall be measured by comparing the future year background conditions to the future year build-out conditions. Requirements for mitigation are described in Section G (19). All TIA reports submitted to the City shall use ~~SYNCHRO~~ Synchro, SimTraffic or VISSIM analysis software for signalized and unsignalized intersections, or Sidra Software, for roundabouts, consistent with policies released by the NCDOT.

A narrative, table, and map shall be prepared that summarizes the methodology and measured conditions at the intersections reported in LOS (LOS A – F), the intersection and approach signal delay for signalized intersections, the approach delay for unsignalized intersections, and 95th percentile queue lengths for all movements. Capacity analysis worksheets and auxiliary turn lane warrants for unsignalized intersections shall be included in the appendix of the TIA report.

b. Multimodal Capacity Analysis- For developments located within the Center City Small Area Plan as defined within Belmont's most recently adopted Comprehensive Land Use Plan, the TIA/TTM shall provide multi-modal operations analyses including vehicular, pedestrian and bicycle traffic, to allow for the safe and convenient travel for all modes.

   i. Pedestrian Analysis - Unless otherwise noted, methodology provided in the latest edition of the HCM shall be used to evaluate pedestrian LOS for the intersections identified in the study area.

   ii. Bicycle Analysis – The bicycle LOS at intersections identified in the study area shall be evaluated using locally accepted methodology.

14. Queuing Analysis – 95th percentile and simulation analysis of future year queues shall be consistent with NCDOT's Traffic Engineering and Safety Systems Branch, Congestion Management Unit current practices and published Capacity Analysis Guidelines. Turn lanes and storage lengths for the major street (uncontrolled) approaches at unsignalized ~~intersections~~ driveways shall be identified using volume thresholds published in the NCDOT's Policy on Street and Driveway Access to North Carolina Highways (see Warrant for Left- and Right-Turn Lanes Nomograph, pg. 80). Recommendations for left and right turn lanes serving the site shall be designed to both account for the NCDOT warrants described above and to meet future year capacity needs identified in the TIA report. For projects that include drive-through facilities, pick-up/drop-off areas, or entrance gates, a queuing analysis may be required by the City to ensure that vehicle stacking will not adversely impact the public transportation system. The queuing analysis must be performed using accepted transportation engineering procedures approved by the City. If a TIA is required for a new school site, the internal circulation and ingress/egress of the site shall be

modeled using a "dummy signal" in the ~~SYNCHRO~~ Synchro software as prescribed by NCDOT Municipal School Transportation Assistance (MSTA) department.

15. Crash Analysis – A summary of crash data (type, number, and severity) for the most recent 3-year period at each study location is required. Traffic Engineering Accident Analysis System reports will be provided by the City and/or NCDOT and shall be included in the appendix of the TIA report. For locations with prevalent crash types and/or frequency, a discussion shall be included describing factors that may be contributing to the incidents. At a minimum, the proposed development features shall not contribute to factors potentially involved in collision rates. If contributing factors are identified, recommendations to eliminate or mitigate these features shall be included.

16. Traffic Signal Warrants – City staff and NCDOT may consider potential signal locations at the scoping meeting. However, traffic flow progression is of paramount importance when considering a new traffic signal location. A new traffic signal shall not cause an undesirable delay to the surrounding transportation system. Installation of a traffic signal at a new location shall be based on the application of warrants criteria contained in the most current edition of the Manual on Uniform Traffic Control Devices (MUTCD) and engineering judgment. Traffic signal warrants shall be included in the appendix of the TIA report. Additionally, spacing of traffic signals within the City must adhere to NCDOT requirements. Pedestrian movements must be considered in the evaluation and adequate pedestrian clearance provided in the signal cycle split assumptions. If a signal warrant analysis is recommended in the TIA, the City and/or NCDOT may decide to defer a signal warrant analysis until after the development has opened to allow use of actual turning movement counts at an intersection. The TIA recommendations must clearly state that this analysis shall occur at a specified date following the opening of the development. The applicant must issue a bond or letter of credit in the name of the City for the estimated cost of the signal warrant analysis and resulting signal prior to final approval of the TIA. The cost shall be established based on an engineer's estimate provided by the engineer of record for the applicant; however, final approval of the dollar amount rests with the City.

17. Mitigation Measure Recommendations – This section of the TIA report shall provide a description of the study's findings regarding impacts of the proposed project on the existing and future transportation system and describe the location, nature, and extent of all mitigation measures recommended to the applicant to improve and/or maintain the future year background conditions ~~level-of-service (~~LOS~~) conditions~~ through phasing and ultimate build-out of the project. This mitigation will be based on the build-out year scenario. The applicant is required to mitigate transportation deficiencies caused solely by the projected impact of their proposed development, and not unacceptable background conditions or other deficiencies caused by offsite development within the defined study area.

    The applicant shall be required to identify mitigation improvements to the roadway network if at least one of the following conditions exists when comparing future year background conditions to future year build-out conditions:

    a. the total average delay at an intersection or individual approach increases by 25% or greater, while maintaining the same LOS,
    b. the LOS degrades by at least one level,

c. or the LOS is "D" or worse in background conditions and the proposed project shows a negative impact on the intersection or approach

If the background LOS (intersection or approach) is inadequate (i.e., "D," "E," or F"), the applicant will be expected to mitigate only the impact caused by the proposed project. For example if the background LOS of an approach is LOS F with 85 seconds of delay, and the project traffic increases the delay to 95 seconds at LOS F~~)~~, the applicant will be required to mitigate the added 10 seconds of delay on the approach, not required to mitigate the inadequate background delay. City staff and NCDOT will review the recommendations in the final version of the TIA and will have the ultimate determination in the scope of the required mitigation measures.

For multi-phase developments, the capacity analyses scenarios shall address the phasing of improvements for each phase of development. The build-out + 5 scenario will require the analysis of only five years beyond the full build-out year. The build-out + 5 scenario analysis is not used for mitigation purposes. A narrative and table shall be prepared that summarizes the methodology and measured conditions at the intersections reported in LOS (LOS A–F) and average control delay for each intersection and approach.

A narrative and map shall also be prepared that describes and illustrates recommended improvements, by development phase if necessary, for mitigating the projected impact of the proposed development.

18. Payment-In-Lieu of Transportation Improvements–A developer may request consideration of payment-in-lieu of required transportation improvements by City Council at the time of schematic plan approval if the following conditions exist:
    a. The developer is unable to secure the needed right-of-way (ROW) for off-site transportation improvements.
    b. Funded transportation projects overlap with the improvements associated with the development's recommended mitigation.

    For multi-phase projects, requests for payment-in-lieu consideration at the time of schematic plan approval shall be limited to the first phase of development.

    All payment-in-lieu requests shall include cost estimate calculations prepared by the applicant that meet the following standards:
    - All cost estimate calculations must be prepared by a professional engineer.
    - Cost estimates shall be based on a minimum of **15% engineered roadway design plans** per City of Belmont Land Development Standards Manual and NCDOT Roadway Design Guidelines.
    - The calculation shall include costs associated with remaining design needed, right-of-way (ROW) acquisition, utilities, construction for the associated improvements**,** and contingency.

    Any requests for payment-in-lieu received following a schematic plan approval and associated traffic mitigation agreement (TMA) shall be considered an as amendment to the approved plans.

    If City Council, at its discretion, agrees to accept payment-in-lieu of transportation improvements for a development, the exact payment amount shall be verified at the time of construction plan review and shall meet the following standards:

- All cost estimate calculations must be updated by a professional engineer.
- Cost estimates shall be based on a minimum of **25% engineered roadway design plans** per City of Belmont Land Development Standards Manual and NCDOT Roadway Design Guidelines.
- The calculation shall include costs associated with remaining design needed, right-of-way (ROW) acquisition, utilities, construction for the associated improvements, and contingency.

All calculated cost estimates shall not be more than two years old at the time of acceptance by the city, and payment must be received prior to approval of the associated construction plans.

19. Compliance with Adopted Transportation Plans – All TIA reports must include a statement of compliance with plans, programs, and policies adopted by the City of Belmont for maintaining a safe and efficient multi-modal transportation system.

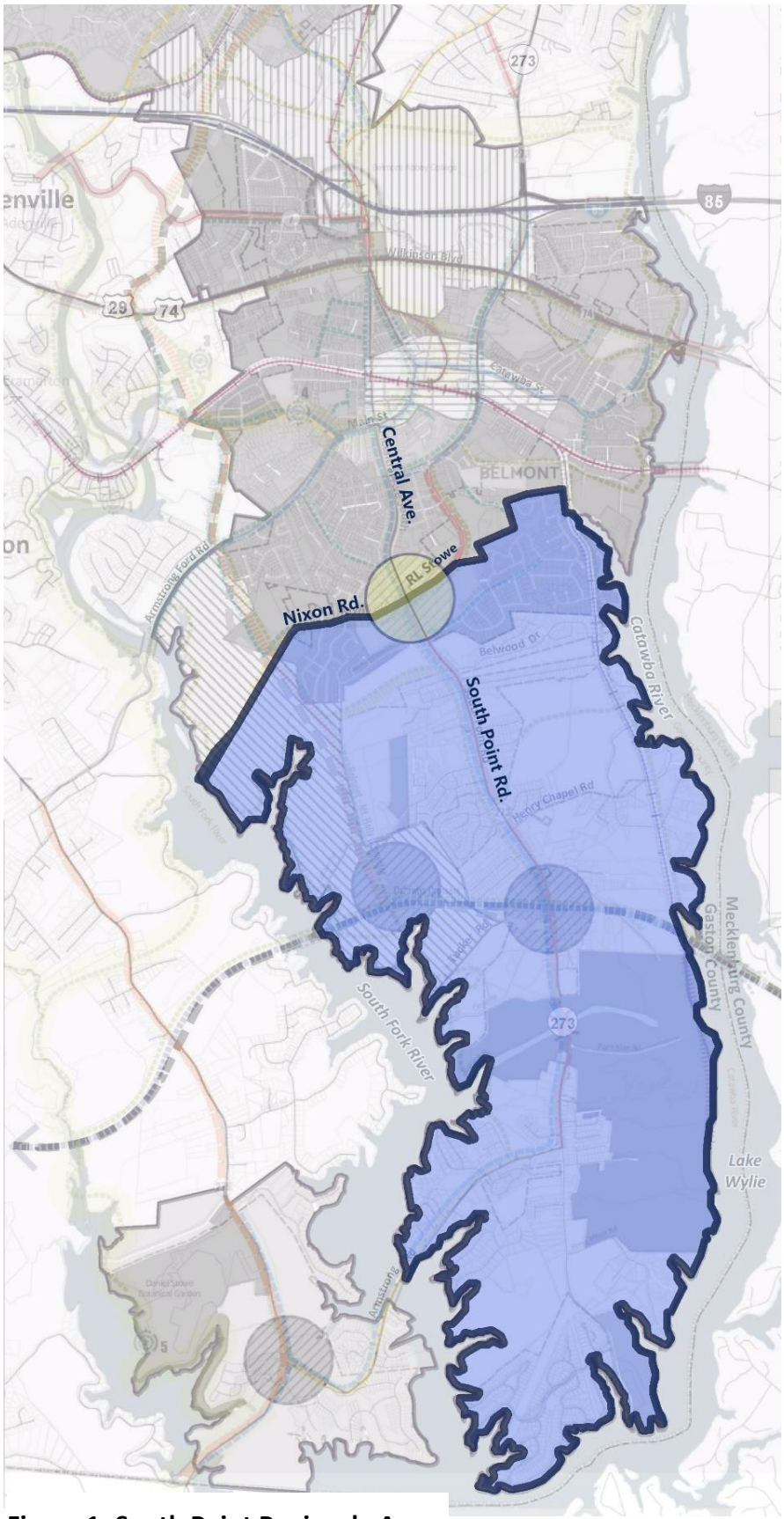

Figure 1- South Point Peninsula Area