AFFIDAVIT OF MATTHEW FOGLEMAN

The undersigned, Matthew Fogleman, being first duly sworn, certifies as follows:

1. I am over the age of 18 and give this affidavit upon my own personal knowledge.

2. I am a North Carolina licensed Professional Engineer, and I am a Principal Engineer with the firm ECS Southeast, LLP. My primary background is geotechnical engineering, and the majority of my professional experience has been in Western North Carolina working in mountainous terrain. As a geotechnical engineer, I work with land planners, civil engineers, landscape architects, architects, and structural engineers as part of their design teams to provide critical guidance related to siting buildings and laying out development features on mountainous properties. I also specialize in slope stability analysis, retaining wall design, and forensic evaluations of slope and wall failures.

3. Attached hereto as Exhibit "1" is my current curriculum vitae.

4. I am the geotechnical engineer of record for the Cashiers Hillside Project as identified and described on its application for a special use permit to Jackson County ("Project"), which permit request is being presented for hearing on January 25, 2021 before the County's Community Planning Council ("Board"). For this development and its special use permit application, I have reviewed the requirements for a special use permit as set forth in the Jackson County Unified Development Ordinance ("Ordinance") and analyzed the Cashiers Hillside development plans for compliance with these requirements. As an engineer of record, I am very familiar with the Project.

5. I have prepared a written report documenting the factual and data support for my opinions, a true and accurate copy of which is attached hereto as Exhibit "2" and incorporated herein by reference.

6. I have reviewed the standards for a special use permit in Section 3.7.15(vi) of the County's Unified Development Ordinance. Based upon my review of the Project and my many years of experience as a licensed Professional Engineer with geotechnical expertise, I am of the opinion that:

- The proposed use or development of the land will not materially endanger the public health or safety as provided in Section 3.7.15(vi)(1)(a).

  The site plans have been developed considering cut depths, fill heights, and slope inclinations that are normal and customary for

  conventional construction in Western North Carolina. The engineered cut and fill slopes proposed for this Project are within the

maximums allowed by the Ordinance. The Project can be constructed safely using conventional construction practices that are in accordance with the Ordinance and with the North Carolina Building Code.

There is no increased risk of landslides to adjacent properties when the Project is constructed in accordance with the Ordinance and the North Carolina Building Code. Particularly with regard to properties adjacent to and near the southwestern portion of the Project site on Bustle Lane (Jackson County PINs 7571-49-9789, 7571-49-9888, and 7571-59-0758) and the adjacent parcels, the natural slope in this area is not severe. The average natural slope in this area ranges from approximately 25% (4H:1V) to 30% (3.3H:1V). As noted above and as further explained in Exhibit "2", these natural slopes do not qualify as "steep slopes" per the Jackson County Mountain and Hillside Development Ordinance (Unified Development Ordinance, Section 5.8), and slopes of these inclinations are normal and typical for conventional construction in Western North Carolina. When constructed properly in accordance with the Ordinance and the North Carolina Building Code, engineered cut and fill slopes and building construction can be performed on slopes of these inclinations safely, and they would not materially endanger public health and safety of downslope neighbors. Very small, localized areas of steeper existing slopes are present immediately adjacent to the existing buildings on Bustle Lane and the adjacent parcels. These are primarily cut slopes that have been excavated into the natural hillside to create level building pads for the existing buildings on Bustle Lane; they are not natural slopes. Bustle Lane is outside of the Project site. Nevertheless, the developments proposed with this Project would be located relatively far away from these small cut slopes and well outside their zones of stress influence. This means that the presence of new developments uphill will not influence the stability of these existing cut slopes.

- The proposed use or development of the land is reasonably compatible with significant natural and topographic features on the site and within the immediate vicinity of the site given the proposed site design and any mitigation techniques or measures proposed by the applicant as provided in Section 3.7.15(vi)(1)(b).

  The natural terrain at the site is not overly steep. The average natural slope of the entire Project area is approximately 20% with most areas along the hillside having approximately 20% to 30%

natural slope. These average slopes are well below the 35% threshold established in Jackson County's Mountain and Hillside Development Ordinance (Unified Development Ordinance, Section 5.8), and the site does not qualify as having "steep slopes" for the purpose of requiring special development considerations per that Ordinance. There are no significant natural or topographic features on the site that would preclude safe development. The soils at the site are favorable to support the proposed construction. There is no evidence of previous landslide activity or current unstable ground at the site. There is no evidence of increased risk of landslides when using construction practices that are in accordance with the Ordinance and with the North Carolina Building Code.

FURTHER AFFIANT SAYETH NAUGHT.

This the 22nd day of January, 2021.

Matthew Fogleman

SWORN TO AND SUBSCRIBED before me this 22 day of January, 2021.

Notary Public

Print Name: Ursula M Finley

My Commission Expires: 1/21/2025

URSULA M. FINLEY
NOTARY PUBLIC
Buncombe County
North Carolina
My Commission Expires January 21, 2025

EXHIBIT 1

MATTHEW FOGLEMAN, PE

PRINCIPAL ENGINEER

REGISTRATIONS/ CERTIFICATIONS

Professional Engineer: NC, FL
NRMCA Concrete Batch Plant Inspection Engineer

SKILLS

Geotechnical Engineering
Materials Testing and Inspection
Forensic Inspections and Engineering
Laboratory Testing

EDUCATION

Bachelor of Science, 1998, Civil Engineering, North Carolina State University, Raleigh, NC

PROFESSIONAL PROFILE

Mr. Fogleman has over 20 years of broad experience in geotechnical engineering, building materials testing and environmental consulting and is currently a Principal Engineer at ECS. Mr. Fogleman has been with ECS for over 10 years. He is responsible for the financial management, training and quality of a full-service office providing geotechnical engineering, construction materials testing and inspections, facilities consulting and environmental services. He has extensive experience in planning, supervising and executing engineering evaluations of buildings and properties, subsurface explorations, complex laboratory testing programs and in providing engineering evaluations and recommendations for construction and repair of municipal, commercial, industrial and institutional facilities. His geotechnical project experience includes conventional subsurface explorations, in-situ geotechnical testing, slope failure and landslide assessments, geophysical testing and geo-structural instrumentation. He also has extensive experience in managing materials testing projects involving large retaining walls, earthen slopes, high-capacity spread footings and mats,driven and drilled piles, cast-in-place concrete, structural masonry and structural steel. His project experience covers a broad range of geological conditions extending from the Blue Ridge Mountains, to the Piedmont of North and South Carolina, to the Coastal Plain.

PROJECT EXPERIENCE

- NC School of Science and Mathematics, Western Campus, Morganton, NC
- Thomas Jefferson Classical Academy High School, Mooresboro, NC
- Mountain Community School Expansion, Hendersonville, NC
- Franklin School of Innovation, Asheville, NC
- WNC Ag Center Pavement Rehabilitation, Fletcher, NC
- New Belgium Brewery, Asheville, NC
- Indigo Hotel, Asheville, NC
- Facebook Data Center, Forest City, NC
- Craven Street Multi-Modal Improvements, Asheville, NC
- Hyatt Place Hotel, Asheville, NC
- Cambria Suites, Asheville, NC
- Bent Tree Slope Repair, Asheville, NC
- The Glen Rock Depot, Asheville, NC
- New Broughton Hospital, Morganton, NC
- Bridgewater Hydroelectric Station, Morganton, NC
- Asheville High School Renovations, Asheville, NC
- Carolina Day School, ESA, Asheville, NC
- Emma Elementary School LCID Closure, Asheville, NC
- The Asheville School, Mitchell Hall, Asheville, NC
- Morganton Heights Shopping Center, Morganton, NC
- Cherokee Emergency Operations Center, Cherokee, NC
- Snow Creek Elementary School, Hickory, NC
- Hayesville Elementary School, Hayesville, NC

EXHIBIT 2

January 22, 2021

Macauley Investments
2870 Peachtree Road NW, Suite 331
Atlanta, Georgia 30305

Attention: Mr. Stephen Macauley

Reference: Professional Opinion Regarding Landslide Risks and Slope Development
Cashiers Hillside
Cashiers, Jackson County, North Carolina
ECS Project No. 31-4154

As requested, ECS Southeast, LLP (ECS) has completed our assessment of the potential landslide risks and slope development considerations for the proposed Cashiers Hillside project. Our services were performed in general accordance with ECS Proposal Number 31-6552-P, dated December 9, 2020. This report summarizes our review of the site conditions and available mapping, and presents our professional opinions regarding the potential for landslide activity, both pre-development and post-development.

This evaluation was focused on the natural site conditions and the general suitability of the anticipated subsurface conditions and topography to support the planned development. The site conditions were evaluated through review of readily available aerial photography, topographic maps, geologic maps, and site reconnaissance. Subsurface exploration and invasive investigation was beyond the scope of this study, as such detailed investigations are not typically performed during this early stage of planning.

During later stages of the project, when the detailed design of specific site components and buildings are developed, appropriate geotechnical investigation and analysis should be performed on a structure-by-structure basis to support the specific site grading design, building designs, and retaining wall designs. These investigations and analyses would typically be performed in conjunction with the civil and architectural designs prior to construction. Similarly, during the construction phase, quality assurance monitoring, inspections, and testing should also be performed by the geotechnical engineer to ensure that various elements of the project are constructed in accordance with the project plans, sound engineering practice, and the Building Code.

Project Information and Proposed Development

The proposed project will consist of a combination of commercial/retail, mixed-use, hotel, and single- and multi-family residential buildings, along with associated structured parking, paved roadways and parking areas, utility infrastructure, public event space, and open space. The retail buildings will be 1 and 2 stories, mixed-use buildings will be 2 and 3 stories, hotel buildings will be 3 and 4 stories, and residential buildings will range from 1.5 to 4 stories.

Stormwater will be managed using a combination of surface features and underground detention chambers. Site grades will generally be accomplished using a combination of engineered cut and fill

slopes, structure foundation retaining walls, and engineered site retaining walls. The preliminary site layout has been developed assuming permanent cut slope inclinations of 1.5H:1V (Horizontal:Vertical) and fill slope inclinations of 2H:1V. Cuts and fills of up to 25 feet deep will be required to accommodate the site layout and geometry. Cuts and fills of this magnitude are common within normal construction practice in Western North Carolina. Site retaining walls will likely be required in various areas, and building foundation retaining walls will be incorporated into the building structures.

Review of Jackson County GIS Data

According to the Master Site and Zoning Plan and the Jackson County GIS website, the entire site encompasses 55.52 total acres and includes 13 parcels identified by Jackson County PINs 7572-51-8525, 7572-51-4656, 7572-41-9317, 7572-41-6231, 7572-41-5028, 7572-51-7004, 7572-41-5031, 7572-40-6689, 7572-40-9807, 7572-40-9539, 7572-40-9466, 7572-40-8445, and 7572-50-0232. The site is generally bounded by NC Highway 107 to the west, Marigold Street to the northwest, commercial properties and US Highway 64 to the north, Monte Vista Road to the northeast, undeveloped properties to the east, undeveloped and residential properties to the south, and commercial properties to the southwest. The approximate location of the site and the various parcels are illustrated on the attached *Figure 1 and Figure 2*.

The topographic contours indicate that the site generally encompasses the western and northern flanks of a low ridge that trends north-south and contains roughly 170 feet of vertical relief (attached *Figures 3 and 4*). The peaks of the ridge are generally at the south-central portion of the site and just beyond the southeastern site boundaries at approximate elevations of 3656 to 3668 feet. The topography generally slopes downward to the west toward NC Highway 107 near elevations 3492 to 3500 feet, and to the north-northeast toward US Highway 64 and Monte Vista Road near elevations 3500 and 3540, respectively. A creek is located along the north-facing slope near the northern-middle of the site and flows to the northwest toward NC Highway 107. The GIS map shows a potential creek along the west-facing slope opposite the intersection with Frank Allen Road; however no evidence of that creek was observed in this area during our site visits.

The natural slope inclinations are relatively flat near the crest of the ridge, and range from about 25% to 30% (4.0H:1V to 3.5H:1V) along most of the western and northern flanks, flattening to about 10% to 17% (10H:1V to 6H:1V) along the northeastern flank, and flattening to near-level at the base of the slopes near the existing roadways. The steepest natural portion of the property is a comparatively small, localized area along the western slope that approaches 36% (2.75H:1V).

Review of Geologic Maps

The property is located in the Blue Ridge Belt of the Blue Ridge Physiographic Province of North Carolina. The Blue Ridge Belt consists of a variety of high-grade metamorphic and sedimentary rocks, with numerous localized igneous intrusions. According to the North Carolina Geological Survey (NCGS) 1985 *Geologic Map of North Carolina*, the town of Cashiers and the immediate vicinity (and hence the site) is located within an igneous intrusion within the surrounding metamorphic rock. The bedrock consists of quartzdiorite and granodiorite of Devonian age (340 my) containing biotite, muscovite, and xenocrysts (mineral fragments that have become entrapped within the magma).

The soils in this geology are the product of the in-place chemical weathering of the parent bedrock. The mineral composition of the parent rock and the environment in which weathering occurs largely control the resulting soil's engineering characteristics.

Residuum is soil that has weathered in-place and normally retains the structure of the original parent bedrock, but it typically has a much lower density and exhibits strengths and other engineering properties typical of soil, not bedrock. In a mature weathering profile, the residuum is generally found to be finer grained at the surface where more extensive weathering has occurred. The particle size of the soils generally becomes more granular with increasing depth, and gradually changes first to weathered and finally to unweathered parent bedrock.

By contrast, **colluvium** is soil derived from in-place soil and rock on the surface that has been transported by gravity down the slope and has become deposited in its current location. Colluvium is the remnants of landslides, and these soils are common throughout the mountains in Western North Carolina given the steep ridges and mountain basins. The presence of colluvium indicates past landslide activity and can be an indicator of potentially unstable slopes in the vicinity.

Landslide mapping has been performed across various Western North Carolina counties by the North Carolina Geological Survey, as well as other geologists, in order to identify existing landslide features indicative of past landslide activity and to help determine potentially susceptible areas where future landslides may occur. For Jackson County, landslide hazard maps were developed by Appalachian Landslide Consultants, PLLC (ALC). *Figures 5 and 6* show the subject site on the Jackson County landslide hazards map, which if they were present, would indicate areas of naturally occurring landslides, landslides on slopes modified by humans, ground subsidence locations, past landslides, accumulated landslide deposits, susceptible areas where natural debris flows (landslides) might initiate, where natural debris flows (landslides) might go, and slope construction caution areas.

Based on our review of the landslide hazard mapping data, we note that the subject site contains none of the features listed above that would be indicative of previous landslide activity nor features of landslide susceptibility. One comparatively small area of the site (+/- 9,000 square feet) is identified as a "slope construction caution area" which is defined by ALC as having "*greater than 20 degree slope angles (36.4%, 2.7:1)."* These are areas where, *"Proper evaluation, design, construction, and maintenance of development in these areas are important."*

Review of USDA Soil Survey Map

The Jackson County GIS database includes soil types mapped by the USDA Natural Resources Conservation Service (NRCS). The NRCS Soil Survey provides soil information to a shallow depth (generally less than 5 feet). The soil types mapped at the site are illustrated on the attached *Figure 7* and are described below.

- EdD – Edneyville-Chestnut complex, 15 to 30 percent slopes, stony
- EdE – Edneyville-Chestnut complex, 30 to 50 percent slopes, stony
- Ud – Udorthents, loamy (along Hwy 107)

The Edneyville-Chestnut soils are both described as very deep and moderately deep residual soils consisting of gravelly and sandy loam that are derived from the parent bedrock. Bedrock is reported at a depth of greater than 60 inches in the Edneyville soil and at a depth of 20 to 40 inches in the Chestnut soil. The soils are both described as well-drained with moderately rapid permeability.

The Udorthents soil is described as areas where the natural soil types have been altered by digging, grading, or filling. These are generally located along the existing corridors of NC Hwy 107 and US Highway 64 where past grading activities have occurred to develop the roadbeds and existing building areas.

We note that these soil types are not identified as colluvial, or the product of previous landslide activity. No colluvial soil types are indicated on the USDA map at the subject site or the immediate vicinity.

Site Visits and Observations

ECS Principal Engineer Matthew Fogleman, PE visited the site on December 18, 2020 and again on January 22, 2021 to observe the general surficial site conditions with a specific emphasis on identifying signs of previous obvious landslide activity and existing unstable slopes. The attached *Site Photographs* show representative conditions at the time of the site visit.

The majority of the site is wooded with mature trees and undergrowth that varies from sparse to heavy. The natural grades were observed to be relatively flat near the crest of the ridge and gently sloping along the majority of the side-slope areas. No outcroppings of bedrock were observed during our site visits. No evidence of past slope movement (landslides) or landslide deposits such as colluvial soils or surface boulders were observed during our site visits.

The natural drainage feature along the north-facing slope was observed at the general area indicated on the GIS map and previously described. The drainage path contained some localized areas of moderately sloping terrain and dense rhododendron underbrush. The specific origination point of the drainage feature was not able to be observed. The second potential drainage feature that is shown on the GIS map opposite Frank Allen Road was not observed during our site visits. No other evidence of groundwater or obvious seeps or springs were observed.

No evidence of significant soil creep was observed during our site visits. Soil creep describes very slow (imperceptible) downhill movements of the ground surface and is an indicator of marginally unstable soils. When soil creep occurs in wooded areas, the mature trees often exhibit curvature in the lower portions of their trunks as the trees try to correct for the movement and continue to grow toward the sun. This results in a characteristic “pistol-butt” shape to the tree trunks. We did not observe any widespread “pistol-butt” trees that would be indicative of unstable soil areas.

No active or recent scarps in the terrain, bulges in the ground surface, missing vegetation, or other indications of past landslide activity or unstable slopes were observed during our site visits.

During our site visits, we did not observe any significant natural or topographic features such as large specimen trees, rock outcroppings, or particularly steep slopes that would preclude safe development.

Direct observation of the site soils was possible where exposed in existing cut slopes. Soils visually appeared to consist of yellowish-brown, light reddish-brown, and light brown silty sand with gravel-size inclusions. The sides of the deeper existing cut slope along the northern property boundary were covered with erosion control matting which obscured direct observation of the soils, but the soils at the base of the excavation appeared to be light gray saprolite.

Conclusions and Professional Opinion

Based on our review of the proposed site plan, our review of available GIS and geologic mapping, our direct observations at the site, and our experience with similar sites and construction, it is our professional opinion that the site is favorable for the planned development from a geotechnical and slope stability perspective. This opinion is based on the following:

- The natural terrain at the site is not overly steep. The majority of the site has average natural slopes in the range of about 25% to 30% (4.0H:1V to 3.5H:1V), with flatter areas near the crest of the ridge and near the roadways. These average slopes are well below the 35% threshold established in Jackson County's Mountain and Hillside Development Ordinance (Unified Development Ordinance, Section 5.8), and the site does not qualify as having "steep slopes" for the purpose of requiring special development considerations per the Ordinance. Therefore, the properties within the site are exempt from the requirements of that portion of the Ordinance. An excerpt from the referenced Mountain and Hillside Development Ordinance is attached.

- Geologic mapping does not indicate evidence of past landslide activity or landslide hazards. The Jackson County landslide hazard map indicated no areas of ground subsidence locations, past landslides, accumulated landslide deposits, susceptible areas where natural debris flows (landslides) might initiate, nor areas where natural debris flows (landslides) might go. The only feature identified was one comparatively small area of the site (+/- 9,000 square feet) that is described as a "slope construction caution area". This feature is shaded yellow on Figures 5 and 6. The slope construction caution area is defined by ALC as having "*greater than 20 degree slope angles (36.4%, 2.7:1)"* and are areas where *"Proper evaluation, design, construction, and maintenance of development in these areas are important."* We concur with this description, and our comments below describe how proper evaluation, design, construction, and maintenance of this area, along with the rest of the site, will be ensured.

- The USDA Soil Survey soil types mapped at the site are described as residuum, which is typically favorable for construction. No colluvium (landslide-deposited soil) is mapped on the site or the immediate vicinity.

- No evidence of past landslide activity, unstable slopes, or excessively steep slopes was observed during our site visit.

- None of the GIS data, various maps, and on-site observations indicated any significant natural or topographic features that would preclude safe development.

It is our opinion that the proposed development of the land will not materially endanger the public health and safety, and it is compatible with the natural and topographic features of the site given the proposed site design and considering the mitigation measures that have been proposed with this project and are described further below. In general, the site is not considered overly challenging by the standards of conventional construction in Western North Carolina. The site plan has been developed to orient buildings and streets such that grading will be minimized, and the existing significant natural features can be maintained to the extent possible. Building design will also incorporate split-level plans and provide access on different floors. This will incorporate the natural topography into the building pads as opposed to creating level building pads, thereby further reducing the required grading.

In areas that will require graded slopes and/or site retaining walls, the North Carolina Building Code dictates strict requirements for the design, construction, and inspection of these structures to ensure their long-term stability and overall safety. Similar to the Building Code requirements that ensure the safety of buildings, the Code also governs site grading, slope construction, and retaining walls. These elements will be constructed in accordance with Appendix J of the Code, as well as Chapter 17 of the Code. Chapter 17 Special Inspections and Tests requires an elevated level of oversight and certification for graded slopes, building pads, and retaining walls during construction.

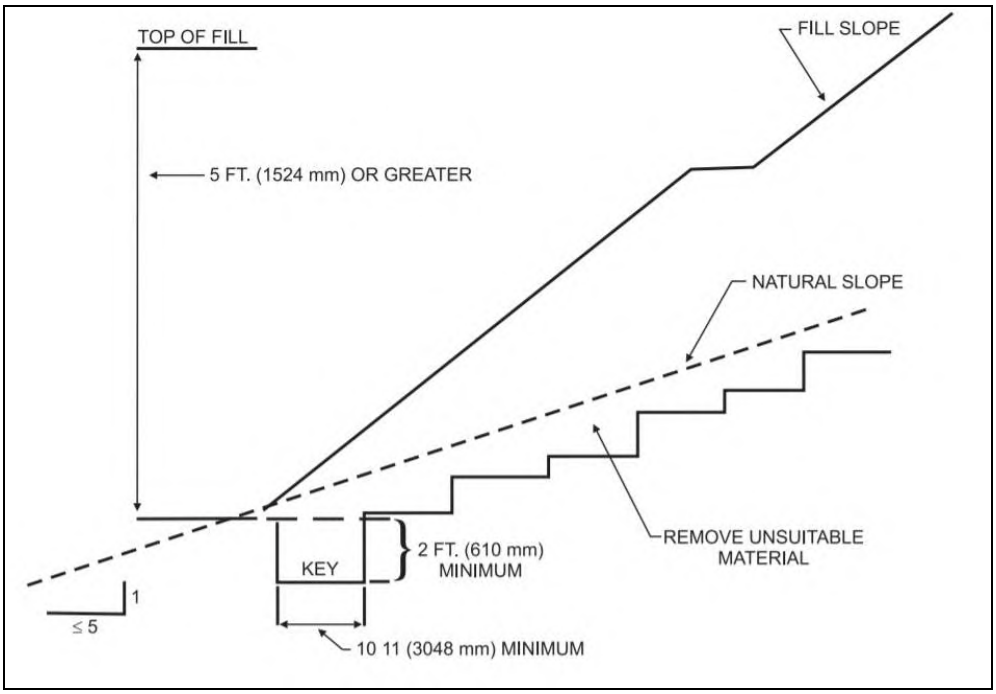
In addition to the site planning considerations described above, the mitigation measures proposed for this project also include close involvement by the geotechnical engineer with the design team during the specific site and building designs, as well as thorough oversight by the geotechnical engineer or their representative during construction. In accordance with the Code requirements, formal geotechnical investigations will be performed within all constructed slope areas, retaining walls, and building foundation areas to support the proper design of these elements. The global stability of slopes and retaining walls will be analyzed by the geotechnical engineer to ensure adequate factors of safety are achieved. Slopes and retaining walls should also be inspected by the geotechnical engineer during construction in accordance with Chapter 17 of the Code to ensure they are constructed in accordance with the plans and specifications and to ensure that the finished elements achieve the factors of safety determined in the designs.

All retaining walls over 48 inches tall must be designed by a licensed Professional Engineer per the Code, and the designs must account for internal stability and external stability, including global stability. All retaining walls over 5 feet tall must be inspected and tested in accordance with Chapter 17 of the Code, which requires continuous inspection and final certification of the retaining walls. If segmental retaining walls will be constructed at the site, they will designed and constructed under the specific guidance provided in the current edition of the *NCMA Design Manual for Segmental Retaining Walls*, as well as the *NCMA Segmental Retaining Walls Best Practices Guide*.

The site layout plan has been developed considering maximum cut slope inclinations of 1.5H:1V and maximum fill slope inclinations of 2H:1V. These constructed slope inclinations are commonly used with construction in Western North Carolina and are stable when constructed in accordance with the Ordinance and the Code. Section 5.8.2, Part b.ii.1 of the Ordinance actually allows for steeper cut and fill slopes (up to 1H:1V cut and 1.5H:1V fill) for general earth moving. Section 4.3.5, Part c.i.7 requires maximum cut slopes of 1.5H:1V and maximum fill slopes of 2H:1V for roadway construction, which matches the site layout plan. The slopes proposed for this development are flatter than the maximums allowed by the Ordinance, and meet those required for roadway construction in the Ordinance. Excerpts of the referenced Mountain and Hillside Development Ordinance and Subdivision Design Ordinance are attached.

As noted above, even though the cut and fill slope inclinations used to develop the site layout are typical for construction in Western North Carolina and are considered stable, the stability of the constructed slopes will be verified during the formal geotechnical investigations performed during the design phase. If there are any areas where these inclinations are not able to be achieved due to the site constraints, then reinforced steepened slopes and/or site retaining walls will be constructed. The geotechnical components of all slopes and retaining walls will be properly evaluated, designed, and inspected by the geotechnical engineer to ensure they achieve the minimum factors of safety for strength and stability. The analyses and designs will also include an evaluation of global stability.

All existing natural slopes that are steeper than 5H:1V or 20% that will receive fill will be benched prior to and during fill placement in accordance with Appendix J of the Code. The design of site grades will adhere to Section J107.3 of the Code, which requires a slope toe keyway and horizontal benching to ensure long-term stability. An illustration from Section J107.3 is provided below.



Benched Fill Detail – Adapted from North Carolina Building Code Section J107.3

The on-site soils identified on the USDA Soil Survey and observed during our site visit are favorable for use as fill and backfill during mass grading, retaining wall construction, and utility installations. If rock is encountered during mass grading, it can be crushed and re-used on site as select backfill for retaining walls and critical slopes to further enhance their performance, stability, and safety.

We emphasize that field observations, monitoring, and quality assurance testing by the geotechnical engineer during construction will be an extension of and integral to the site grading design. ECS will be involved during these critical phases of construction to help ensure that the geotechnical recommendations related to slope stability are properly integrated into the construction and that slopes are not constructed which will create unstable conditions.

Closing

We appreciate the opportunity to provide our professional opinion and to assist with this project. If you have any questions about the contents of this report, please contact us at 828-665-2307.

Respectfully submitted,
ECS SOUTHEAST, LLP represented by:

Matthew S. Fogleman, P.E.
Asheville Branch Manager, Principal Engineer
NC License No. 031049

Attachments:
Figure 1 – Jackson County GIS Site Location
Figure 2 – Jackson County GIS Site Location
Figure 3 – Jackson County GIS Topographic Contours
Figure 4 – Jackson County GIS Topographic Contours
Figure 5 – ALC Landslide Hazard Map
Figure 6 – ALC Landslide Hazard Map
Figure 7 – USDA NRCS Soil Survey Soil Units
Site Photographs
Jackson County Ordinance, Section 5.8, Mountain and Hillside Development
Jackson County Ordinance, Section 4.3, Subdivision Design

Cashiers Village

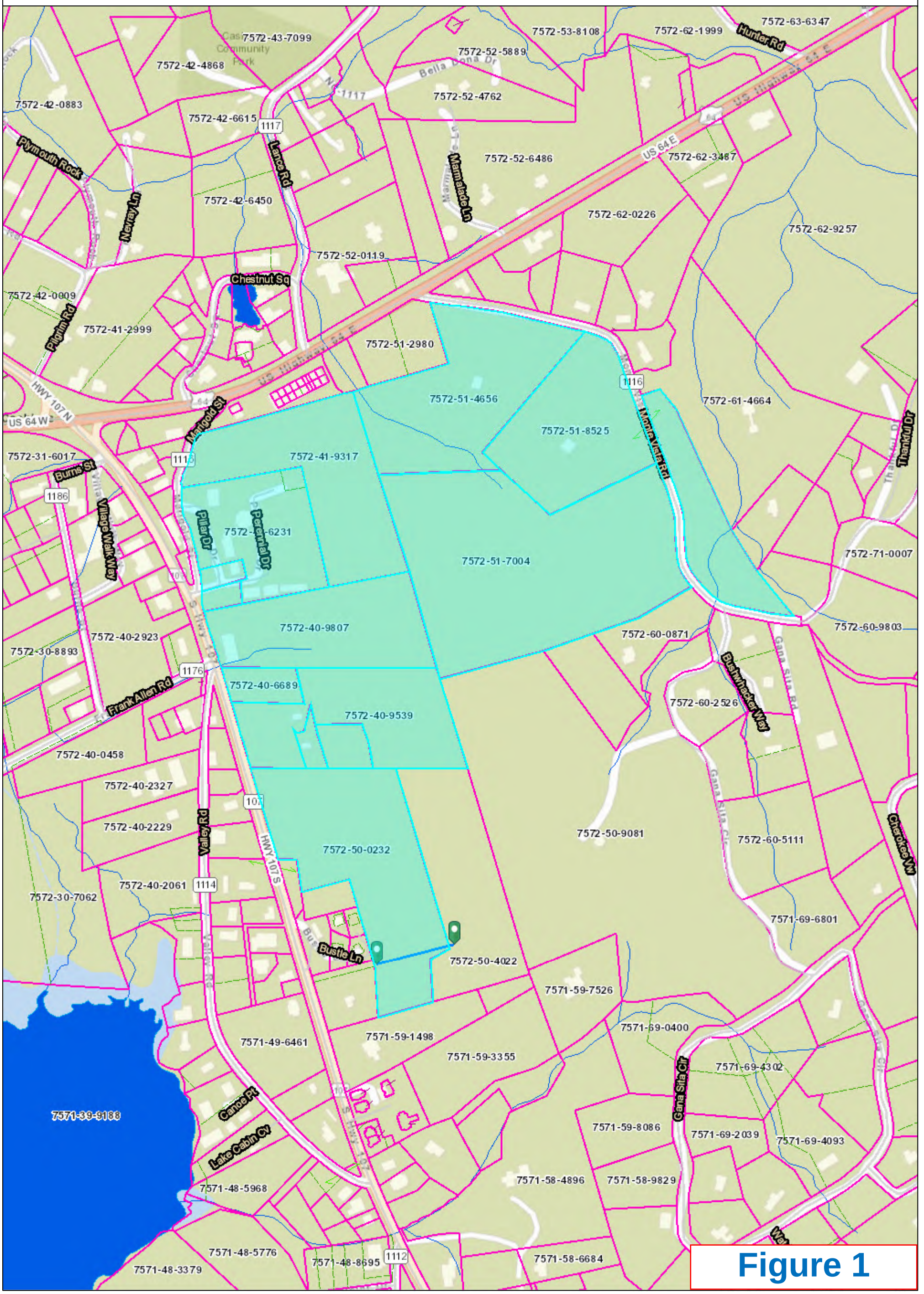


Figure 1

Centerlines
Leader Line
Parcels
Stream

Parcel Lines

Easement
Lot Line
Parcels
Hooks
Subdivision ROW
Water Body

N W E S

0 112.5 225 450 ft

WARNING: THIS IS NOT A SURVEY!. This map is prepared for inventory of real property within Jackson County. It is compiled from recorded deeds, plats, and public data records. Users of this map are hereby notified that the aforementioned public information sources should be consulted for verification. Jackson County or any County representative assumes no legal responsibility for the contents of this map.

Cashiers Village

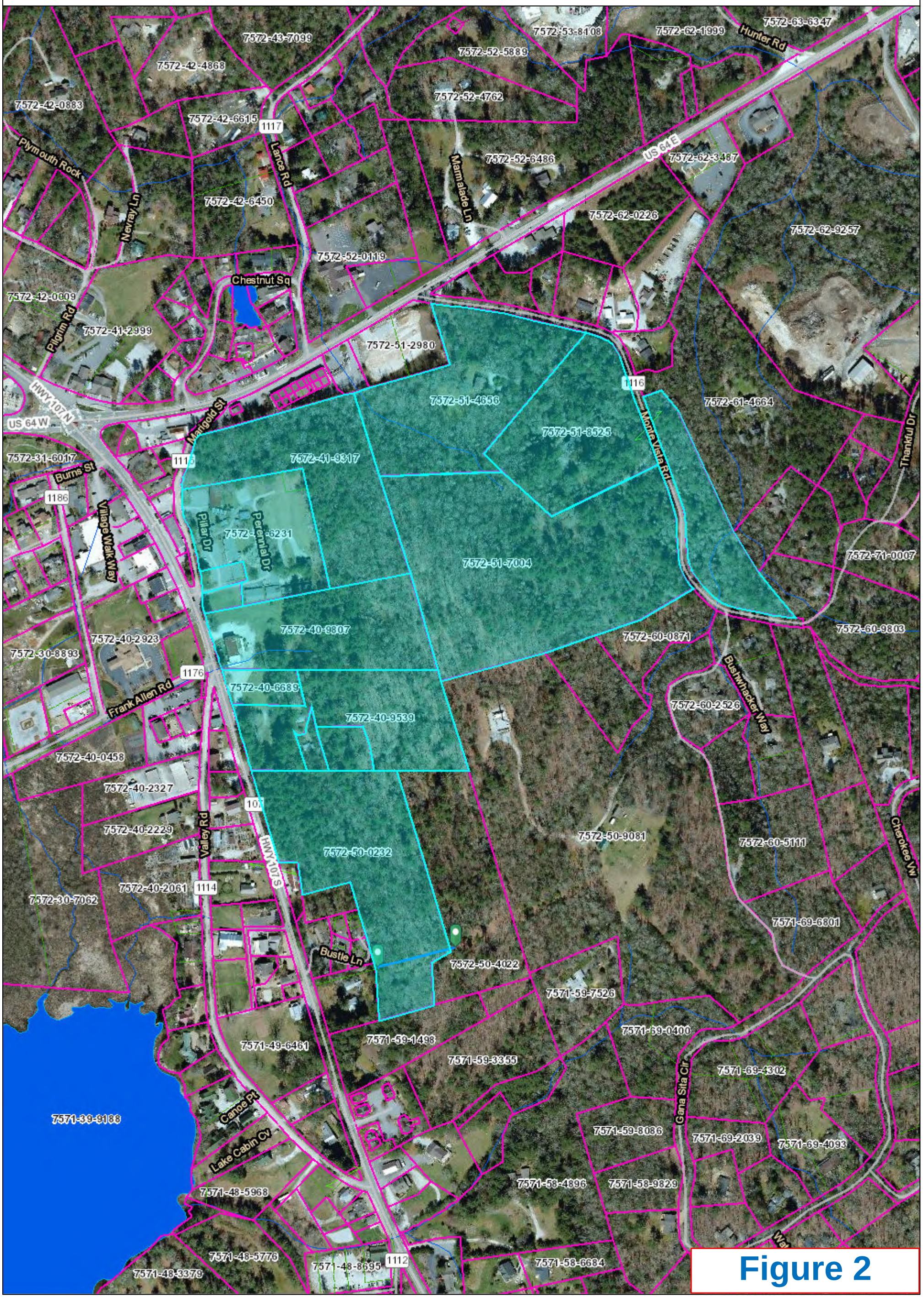


Figure 2

Centerlines
Leader Line
Parcels
Stream

Parcel Lines

Easement
Lot Line
Parcels
Hooks
Subdivision ROW
Water Body

N
W E
S

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Cashiers Village

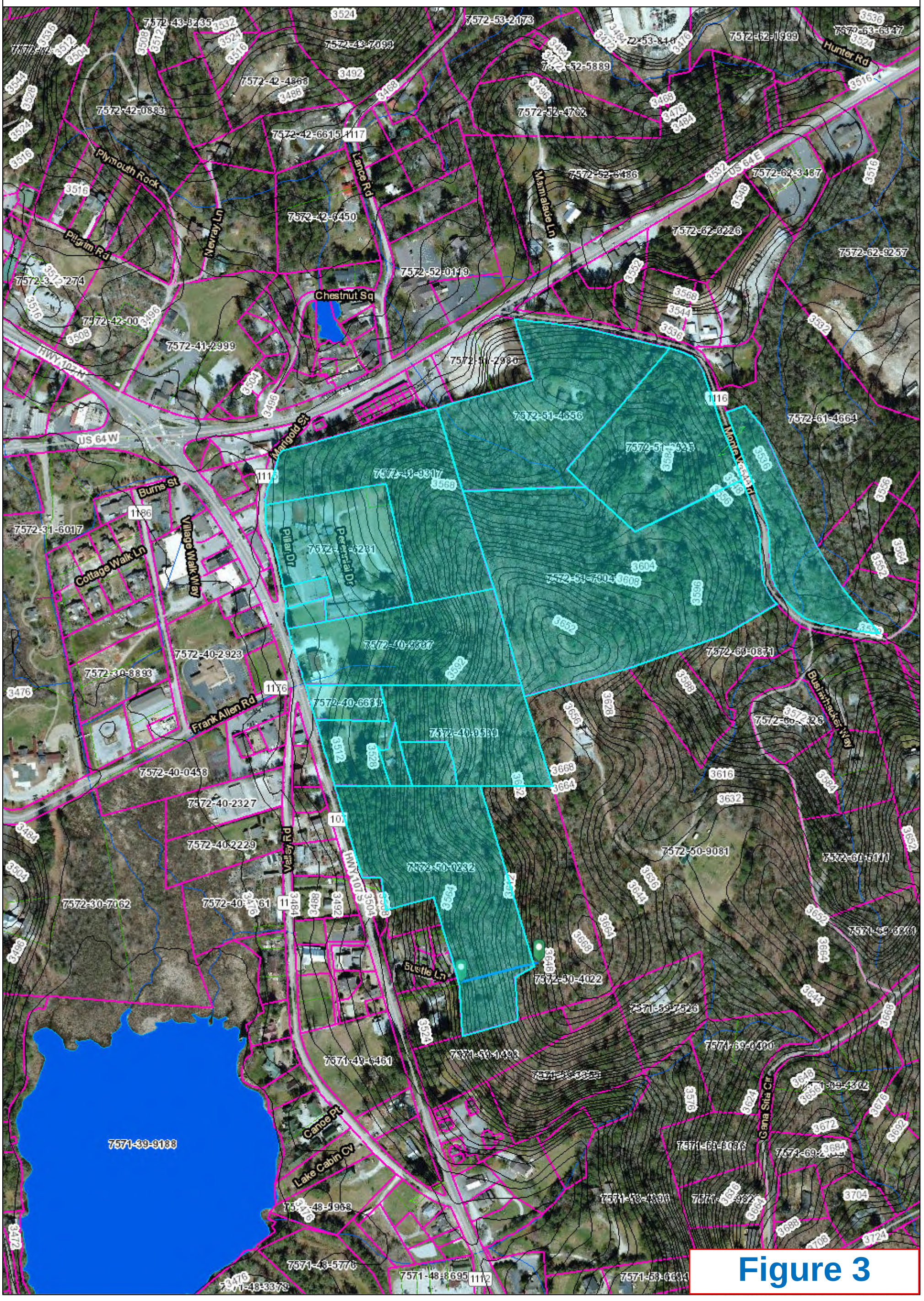

Figure 3

- Contour_4ft
- Centerlines
- Leader Line
- Lot Line
- Hooks
- Subdivision ROW
- Parcels
- Parcels
- Water Body
- Stream

Parcel Lines

- Easement

N W E S

0 112.5 225 450 ft

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Cashiers Village

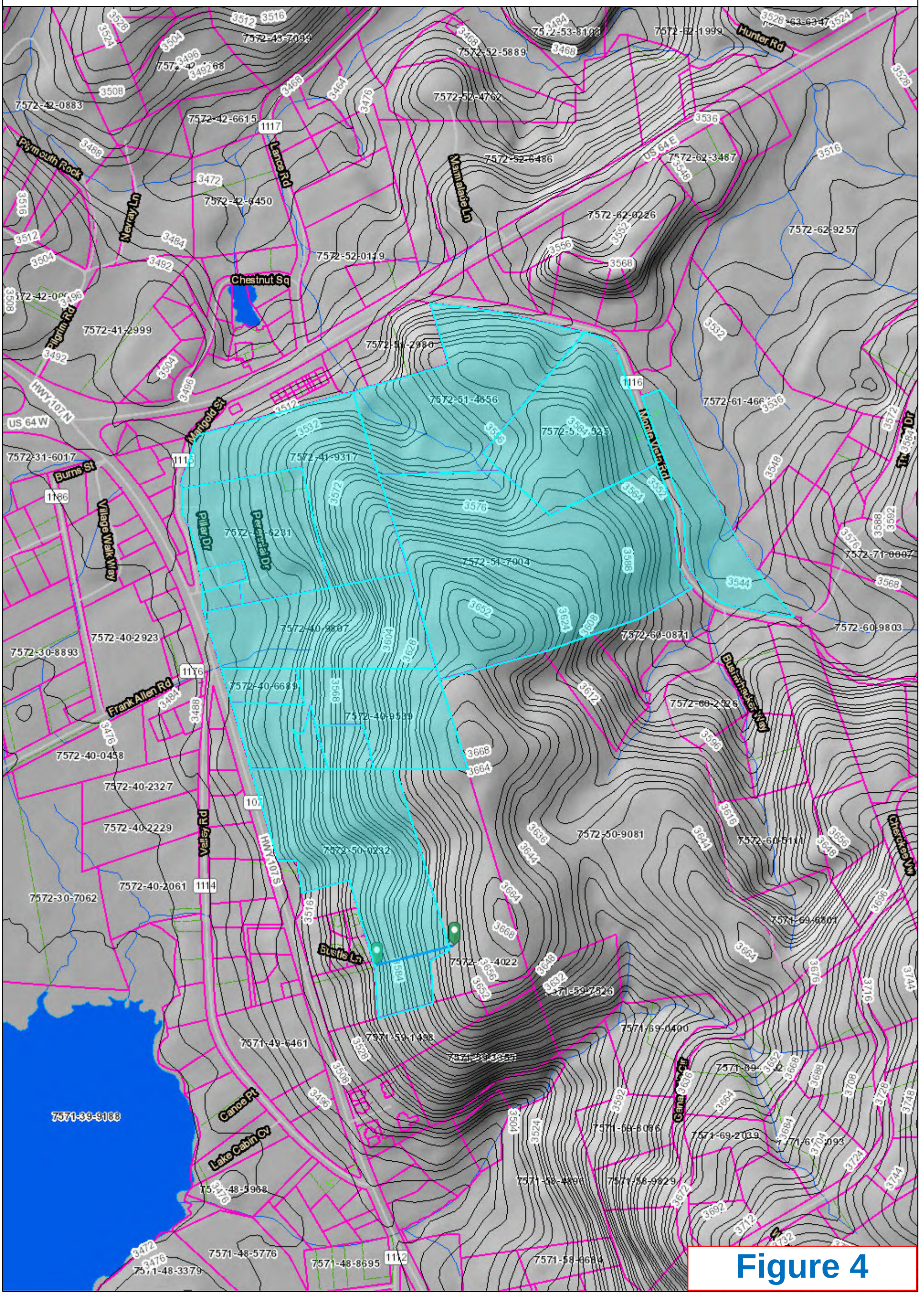

Figure 4

- Contour_4ft
- Centerlines
- **Parcel Lines**
  - Easement
- Hooks
- Leader Line
- Lot Line
- Subdivision ROW
- Parcels
- Parcels
- Water Body
- Stream

N W E S

0 112.5 225 450 ft

WARNING: THIS IS NOT A SURVEY!. This map is prepared for inventory of real property within Jackson County. It is compiled from recorded deeds, plats, and public data records. Users of this map are hereby notified that the aforementioned public information sources should be consulted for verification. Jackson County or any County representative assumes no legal responsibility for the contents of this map.

Cashiers Village - Landslide Hazard Map

January 14, 2021

Click "Details" above for more information about this map.

Boundary of ALC landslide maps

Natural Debris Flow Caution Areas

- Where natural debris flows might start
- Where natural debris flows might go
- Slope Construction Caution Areas

Natural Debris Flow Caution Areas

- Where natural debris flows might start
- Where natural debris flows might go
- Slope Construction Caution Areas

1:4,514

0 0.04 0.08 0.16 mi

0 0.05 0.1 0.2 km

Figure 5

Cashiers Village - Landslide Hazard Map

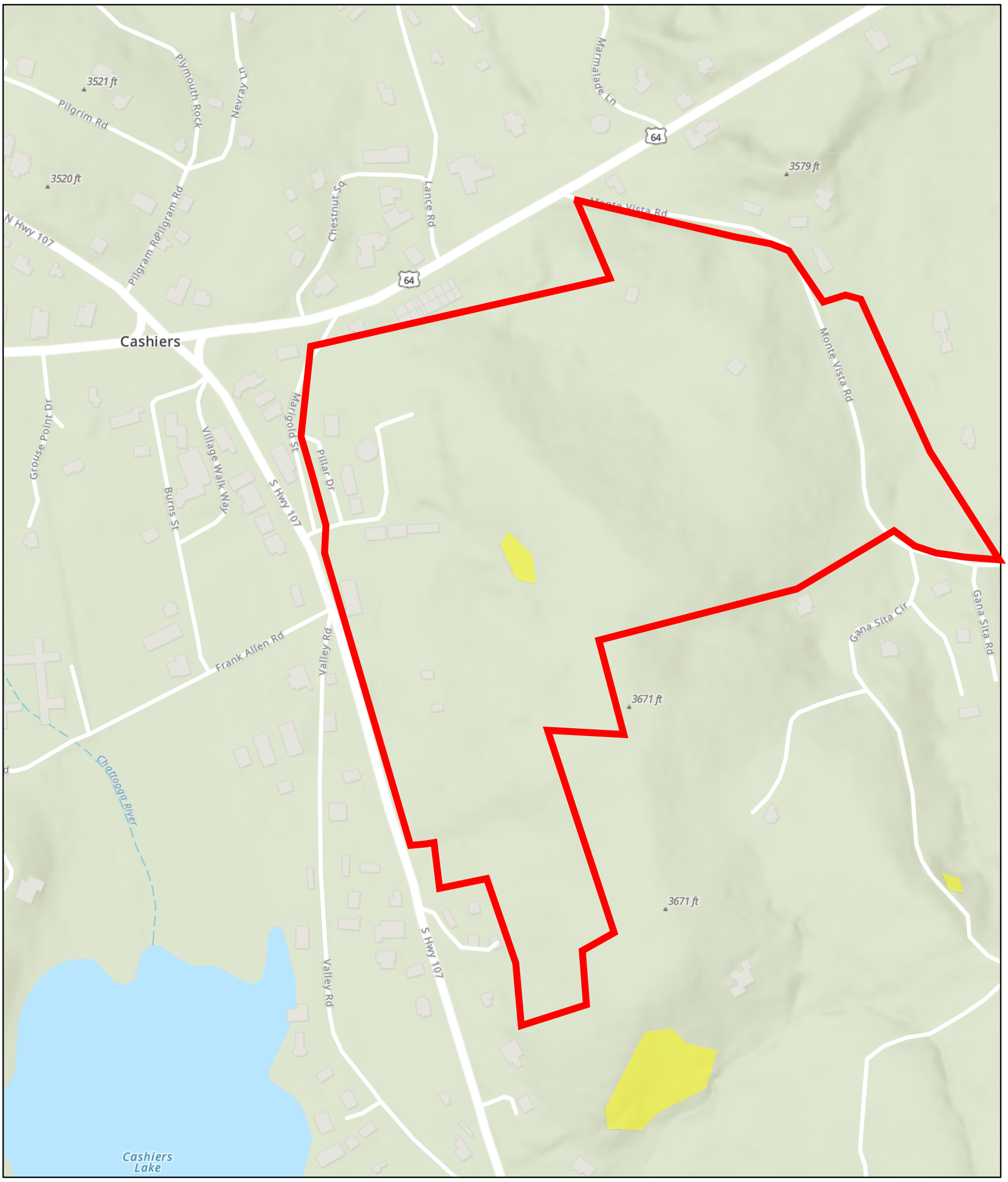

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Figure 6

Esri Community Maps Contributors, State of North Carolina DOT, Tennessee STS GIS, BuildingFootprintUSA, Esri, HERE, Garmin, SafeGraph, INCREMENT P, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA

Cashiers Village

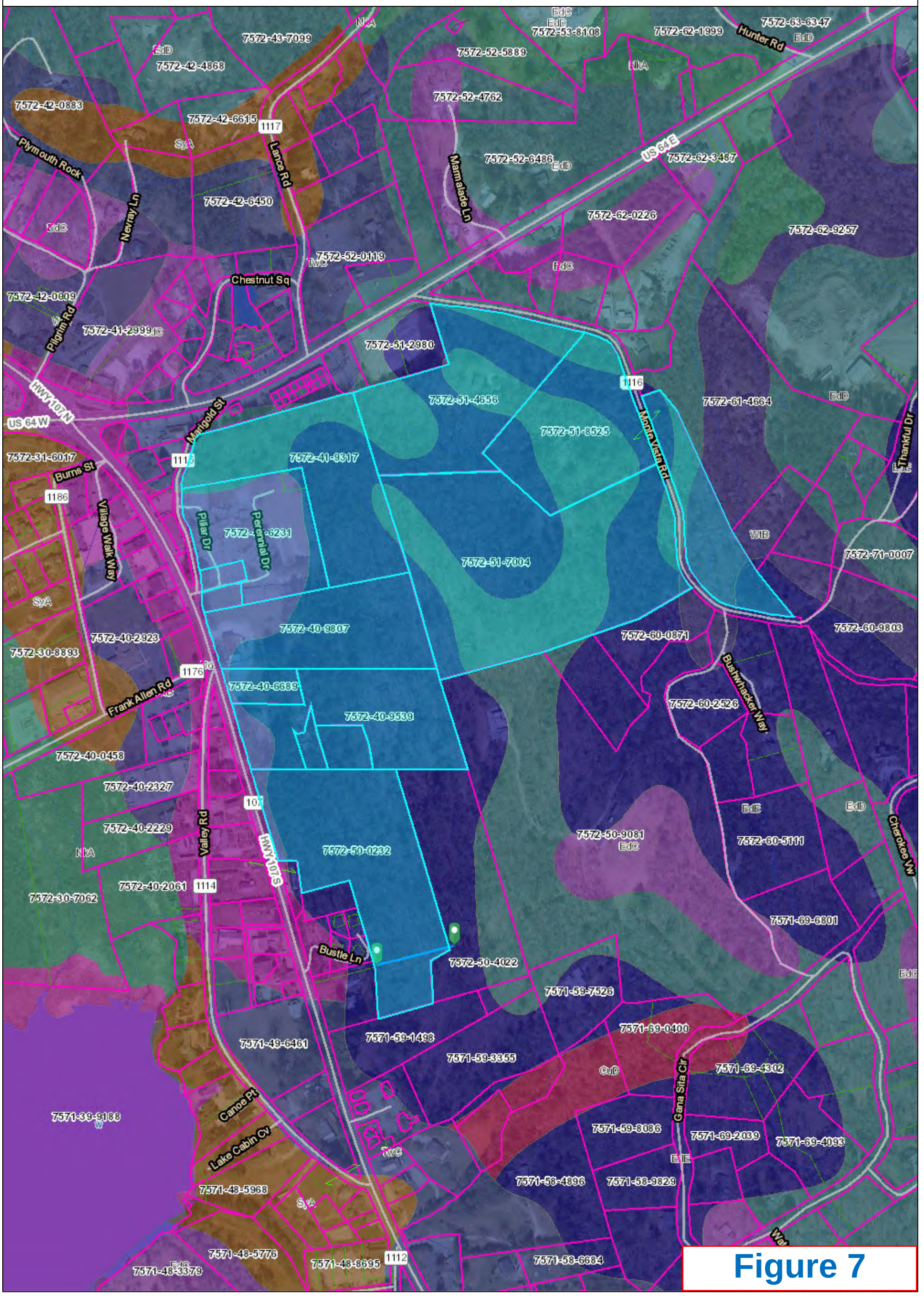

Figure 7

Centerlines
Leader Line
Parcels
Stream

Parcel Lines

Easement
Lot Line
Parcels
Hooks
Subdivision ROW
Water Body

N
W E
S

0 112.5 225 450 ft

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Photo 1: Graded area at northwestern perimeter of site.

Photo 2: Graded area at northwestern perimeter of site showing exposed residual cut soils.

Photo 3: Graded area at northwestern perimeter of site showing exposed residual cut soils.

Photo 4: Graded area at northwestern perimeter of site showing exposed residual cut soils.

Photo 5: Existing grades at western portion of site.

Photo 6: Existing grades at western portion of site.

Photo 7: Existing grades at interior of site.

Photo 8: Existing grades at interior of site.

Photo 9: Existing grades at interior of site.

Photo 10: Existing grades at interior of site.

Photo 11: Existing small stream at northern portion of site.

Photo 12: Graded area at northern perimeter of site showing residual cut soils.

Sec. 5.8 - Mountain and hillside development.

Sec. 5.8.1 General Provisions.

(a) *Findings.*

(i) The mountains of Jackson County, North Carolina, are characterized by steep slopes and thin soils. Land-disturbing activity on high-elevation, steep-slope mountains potentially threatens the public health, safety, welfare, and economic progress of Jackson County. Such land-disturbing activity has the potential to do the following: (a) endanger the quality of surface water by increasing erosion, stream sedimentation, and stormwater runoff; (b) induce landslides; (c) adversely affect ground water due to the difficulty in providing proper sewage disposal; (d) damage the habitat for some species of wildlife (both plants and animals); and (e) detract from the mountains' scenic and natural beauty which is vital to the recreation and tourism industry of Jackson County.

(ii) The Jackson County Board of Commissioners finds the following:

1) Steep hillsides are inherently unstable.

2) Changes to slopes—Through undermining by humans, flowing rivers, heavy rains, or the focusing of stormwater runoff by human-built channels or storm drain outlets can cause erosion or landsliding. Soil slips, which cause avalanche-type failures, and slower-moving earth flows can occur on slopes of 25 percent and more. Serious erosion can occur on much shallower slopes. Steeper slopes are less forgiving of construction errors than are shallower slopes.

3) When steeper slopes fail, such failures can have disastrous consequences. Disturbed surfaces create loose materials which tend to move downhill. Development can result in alteration of land surfaces that can contribute to slope destabilization. Alterations that have the potential for creating unstable slopes include placing fills on top of marginally stable slopes, cutting slopes at too steep an angle or undermining the toe of a slope, redirecting storm runoff in a way that artificially concentrates flows onto portions of the landscape not prepared to receive such flows, removing woody vegetation, and adding water by means of hillside septic systems. These factors work together and can cumulatively decrease the stability of slopes and eventually lead to disaster. Landslides and slope failures pose a variety of hazards to persons and property.

4) Hillside development, if unregulated, can take place at the expense of environmental concerns. Stormwater runoff from slopes is greater in both quantity and velocity than it would be from level ground. Preserving existing vegetation reduces erosion by maintaining roots which increase infiltration and bind soils. Vegetation also reduces the velocity of raindrops and slows the velocity of surface water flow by increasing the roughness of the ground, thereby increasing groundwater recharge. Constructing hillside roads involves cuts in the upslope side and fills on the down slope side. Such cuts and fills are often much wider than the minimum required road right-of-way and can be more susceptible to failure.

5) Hillsides and ridge lines are unique vegetation communities and wildlife habitats. Hillsides in developing areas are often the last remaining natural areas and are the final refuges for many species of wildlife. Development needs to be sensitive to the hillside's function of providing biodiversity.

6) Hillsides have aesthetic value to Jackson County and its municipalities and contribute to the community's sense of identity, as well as its tourism economy. Prominent mountains, peaks, hills, and ridges have significance as identifiable landmarks to area residents. Hillside development, if unregulated, can take place at the expense of aesthetic concerns. Hills and ridges are highly visible from surrounding areas.

7) Vegetation clearance and landform grading practices, if unregulated, can upset the natural shape of hills.

The bulk, shape, height, and color of buildings can contrast with the natural landscape if unregulated and thus intrude on the natural character of the landform. Regulations are needed to ensure that buildings and structures blend in with the natural environment through their placement on the land, shape, materials, and colors.

(b) *Purpose, Intent and Objectives*.

(i) It is the purpose of this section to provide development regulations applicable to mountains and hillsides to ensure that development occurs in the following manner:

1) Protects the natural conditions and respects existing topography;

2) Prevents inappropriate development;

3) Preserves the aesthetic and scenic qualities of such areas;

4) Ensures the public health, safety, and general welfare.

(ii) The provisions of this section are intended to prevent developments that will erode hillsides, result in sedimentation of lower slopes and bodies of water, cause damage from landslides or create the potential for damage from landslides, flood downhill properties, or result in the severe cutting of trees or the scarring of the landscape. It is the intent of this section to encourage a sensitive form of development and to allow for a reasonable use that complements the natural and visual character of the community. These purposes cannot be met fully with existing development regulations such as subdivision, soil erosion and sedimentation control, and flood damage prevention. This section is considered the minimum necessary to attain these purposes. These regulations are also intended to encourage the application of principles of landscape architecture, architecture, planning, and civil engineering to preserve the appearance and protect the resources of mountains and hills.

(c) *Establishment of the Mountain and Hillside Development District*.

(i) The Mountain and Hillside Development District is hereby established, the boundaries and extent of which are depicted on the map entitled "Mountain and Hillside Development District Map" (herein referred to as the district map), which is hereby adopted as if fully set forth in this Ordinance. Said map shall be attached to the copy of this Ordinance filed with the Clerk of the Board of Commissioners upon adoption and shall be available for public inspection in the office of the Jackson County Planning Department. The district map identifies all those areas with a slope of 35 percent or more, and is to be used to identify properties on which further analysis is required.

(d) *Applicability*.

(i) This section shall apply to any subdivision plat, land-disturbing activity, building permit, or any other development proposal on property situated within the Mountain and Hillside Development District.

(ii) This section shall apply, and the Planning Director shall apply and enforce the provisions of this Ordinance, to the earliest application for development or building approval required of the applicant.

(iii) When an application for a preliminary subdivision plat, preliminary development plan as may be required by other provisions of the ordinances of Jackson County, land-disturbing activity (e.g., soil erosion and sedimentation control plans), or a building permit pertaining to property regulated by this Ordinance is filed, said application shall be required to demonstrate compliance with applicable provisions of this ordinance, unless compliance has already been satisfactorily demonstrated by prior application and approval as determined by the Planning Director.

(e) *Exemptions*.

(i) The following land uses or activities are exempt from the requirements of this Ordinance provided they

comply with any limitations or conditions specified herein.

1) Agriculture and forestry. Agriculture and forestry on protected mountains, provided such uses or activities, including associated roads, are consistent with the best management practices established by the North Carolina Division of Forest Resources or the North Carolina Natural Resources Conservation Service, consistent with all State and Federal laws, and all applicable regulations promulgated by the State of North Carolina. Logging roads shall be reclaimed in accordance with practices of the division of forest resources when they are no longer in service.
2) Landscape maintenance. Landscape maintenance activities, including the removal of diseased, dead or damaged trees; provided, however, that such activities shall be carried out in conformance with applicable regulations of this Ordinance.
3) Additions to single-family residences. On lots of record with existing residences that were approved prior to the effective date of this section, said existing residences may be expanded without demonstrating compliance with this ordinance, provided that the height of the building addition does not exceed the height limitation contained in subsection 5.8.4(a)(v), no more than minimal land disturbance is required to accomplish the building addition, and the building addition is in conformity with the purposes and intent and consistent with regulations and guidelines of this ordinance as determined by the Planning Director.

(ii) *Existing Lots of Record*.

1) The owner, or any successor in interest, of any lot of record existing as of the effective date of this Ordinance shall be entitled to build one single-family home thereon.
2) Such lot shall be exempt from the requirements contained in this Ordinance provided that the development of such home shall be done in compliance with the following provisions: subsection 5.8.2(b)(i), minimum alterations, subsection 5.8.2 (b)(ii), cut and fill, subsection 5.8.2(b)(iii), compaction of fill, subsection 5.8.3, regarding driveways, subsection 5.8.4(a)(vii), partial screening, subsection 5.8.4(a)(viii), hazardous waste facilities, as well as requirements contained within Section 5.8.6, Best Management Practices.

(iii) *Prior Development Plan Approval*.

1) It is recognized that some or all of the lots in subdivisions for which a determination of vested rights has been made, either pursuant to the Jackson County Vested Rights Ordinance or by final judgment of a court of competent jurisdiction, may not be lots of record.
2) For a period of two years subsequent to the effective date of this Ordinance, or such longer period as may have been granted in the determination of vested rights, the building of homes in subdivisions determined to be vested shall be treated as if they were lots of record and regulated in accordance with subsection 5.8.1(e)(ii).
3) Subsequent to this vesting period, the building of homes or other improvements on lots in such subdivisions which have not been recorded shall comply with applicable requirements of this ordinance unless the Planning Director determines that such compliance would result in practical difficulty or unnecessary hardship.

(iv) *Non-Regulatory Lots*.

1) Lots of record which are not situated on a protected mountain ridge, as defined herein, and for which the average slope, as determined by subsection 5.8.2 (c), below, is less than 35 percent, shall be exempt from the requirements of this ordinance.

Sec. 5.8.2 Administration.

(a) *Relationship to Other Regulations*.

(i) Nothing in this Ordinance shall be construed to modify or exempt development from applicable requirements of the State and other ordinances or regulations of Jackson County, including but not limited to the following:

1) *Land disturbance*.

a) Proposed land-disturbing activity shall meet all applicable State standards and all regulations of Jackson County relating to soil erosion and sedimentation control. The provisions of this Ordinance are more restrictive and require the submission of plans and a permit which may not be required by said land-disturbance and soil erosion requirements.

2) *Septic tanks*.

a) Where one or more septic tanks are to be used for individual sewage disposal, the proposed land-disturbing activity shall meet all applicable State standards and all applicable regulations of Jackson County relating to septic tanks.

3) *Sewage disposal*.

a) If sewage treatment is to be provided by any means other than one or more individual septic tanks, the sewage treatment shall meet all applicable State standards and all applicable regulations of Jackson County relating to sewage disposal.

4) *Individual wells*.

a) Where one or more wells are to be used for water supply, the proposed land-disturbing activity shall meet all applicable state standards and all applicable regulations of Jackson County relating to water wells.

5) *Water systems*.

a) If a public water supply system is to be provided, the water supply system shall meet all applicable State standards and all applicable regulations of Jackson County relating to public water systems.

(b) *General Regulations for all Development and other Land-Disturbing Activity*. The following minimum standards shall apply to earth moving and land-disturbing activity which is not otherwise exempt:

(i) *Minimum alterations*.

1) Earth moving shall be limited to the minimum required for building foundations, driveways, drainage control structures and immediate areas surrounding the building, structure, road driveway, or drainage structure required by this section.

2) With the exception of approved stockpiling or restoration efforts, substantial earth moving beyond that required for the installation or construction of approved buildings, structures, driveways, roads, or drainage structures shall not be permitted.

(ii) *Cut and fill*.

1) Unless otherwise specifically approved by the Planning Director, cut slopes shall be no steeper than one foot horizontal to one foot vertical and fill slopes shall not be steeper than one-and-one-half feet horizontal to one foot vertical.

2) Artificial slopes exceeding 35 feet in height shall be benched at 35-foot intervals.

(iii) *Compaction of fill*.

3) Dwellings shall be located in unwooded parts of the site to prevent unnecessary clearing practices. Exceptio made when a site investigation by County staff reveals all or part of wooded areas are not worth saving due decay/disease or unsightly overgrowth.

4) The impacts on larger woodlands over five acres shall be minimized as much as practical.

5) Where farmland preservation is the goal of a site design, dwellings shall be located away from active farming areas, as is practical.

6) Where preserving scenic views is the goal of a site design, such scenic views should remain unblocked and uninterrupted. In wooded areas, where enclosure (i.e., a tree canopy) is a feature to be maintained, a no-cut and no-build buffer shall be considered along the public roadway.

7) Where historic or archeological preservation is the goal of a site design, new streets, driveways, fences and/or utilities shall not interfere with the historic site. Building designs of the new homes shall reflect the qualities and designs of the historic buildings, as much as is practical.

8) Where power line rights-of-way are proposed to be included as part of the open space, the right-of-way shall not exceed 50 percent of the required permanent open space.

Sec. 4.3.4 Open Space—Cluster Development.

(a) *Open Space Use, Location and Design (Sec. 10-591).*

(i) All built-upon area shall be designed and located to minimize stormwater runoff impact to the receiving waters and minimize concentrated stormwater flow.

(ii) The remainder of the tract shall remain in a vegetated or natural state. The title to the open space area shall be conveyed to a property owners' association for management; to a local government for preservation as a park or open space; or to a conservation organization for preservation in a permanent easement. Where a property owners' association is not incorporated, a maintenance agreement shall be filed with the property deeds and a copy submitted to the division of environmental management.

(iii) A minimum 30-foot vegetative buffer for development activities is required along all perennial waters defined as:

1) Streams and impoundments indicated on the most recent versions of United States Geological Survey (USGS) 1:24,000 (7.5 minute) scale topographic maps.

2) Streams and impoundments, including natural or manmade surface channels in which water flows most of the year.

3) Streams and impoundments as determined by local government studies.

(iv) No new development is allowed in the buffer except for water-dependent structures. Other structures (not to include slated decks) such as flag poles, signs and security lights which result in only minor increases in impervious area, and public projects such as road crossings and greenways where no practical alternative exists would be allowed. These activities should minimize built-upon surface area, direct runoff away from the surface waters and maximize the utilization of stormwater best management practices. Additional development that would reduce the area of vegetative buffer shall be prohibited.

(v) Development projects permitted under the Special Intensity Allocation (SIA) shall provide a minimum 50-foot vegetative buffer. Desirable artificial stream bank or shoreline stabilization is permitted.

Sec. 4.3.5 Street Standards.

(a) *Relation to Transportation and Land Development Plans.*

(i) Arrangement, character, extent, width, grade, and location of all roads shall conform to the officially adopted

Thoroughfare Plan or Comprehensive Transportation Plan, the adopted County Land Development Plan or elements thereof and any other adopted plan and shall be considered in relation to the following:

1) Existing and proposed transportation patterns.
2) Topographic and other natural features.
3) Public convenience and safety.
4) Appropriate relation to proposed uses of land to be served by such streets and existing or potential land uses in adjoining areas.

(ii) The subdivider shall dedicate lands and fund necessary road improvements in conformity with adopted transportation or land use plans to the extent that such are adequately related to the traffic expected to be generated by the subdivision.

(b) *Public Roads (Sec. 28-62).*

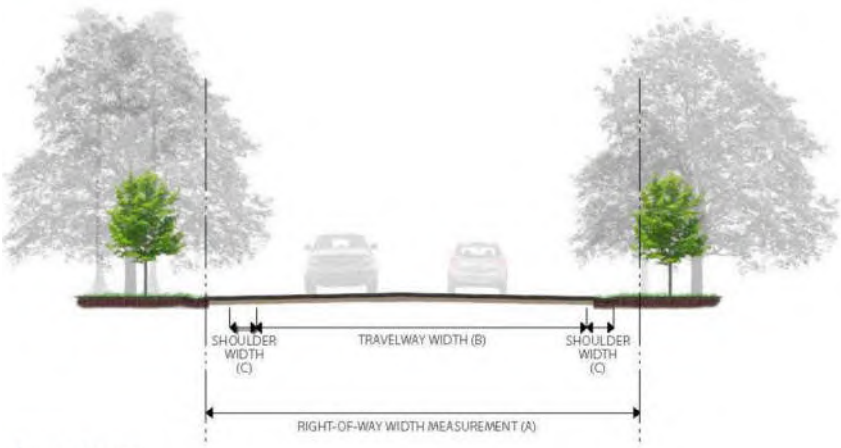
(i) All subdivision lots shall abut a public or private road for a distance of at least 30 feet. Public subdivision roads shall be designed and built according to the standards in the North Carolina Department of Transportation's Subdivision Roads Minimum Construction Standards. These roads shall be maintained by the developer/owner until the North Carolina Department of Transportation assumes responsibility for maintenance. Roads which are not eligible to be put on the State Transportation system because there are too few residences shall nevertheless be dedicated for public use and shall be built in accordance with State Department of Transportation Standards. Where a road has been offered for public dedication, that offer may not be withdrawn without prior approval from the Director.

(c) *Private Roads (Sec. 28-190).*

(i) *Design Criteria.*

1) Private subdivision roads shall connect to an existing state-maintained road and shall be constructed in accordance with the standards contained in the North Carolina Department of Transportation's most recent version of Subdivision Roads Minimum Construction Standards.
2) Roads that are not required to be constructed to state standards will be privately maintained, and maintenance responsibilities shall be noted on the final plat. Regardless of the designation of the road, every lot shall have access to a road that is sufficient to provide a means of ingress and egress for emergency vehicles as well as all those likely to need or desire access to the property for its intended use. (Sec. 28-62.1. B)
3) Roads shall be designed by a registered professional engineer or professional land surveyor licensed to work in North Carolina, as provided for by G.S. 89C-3. Prior to approval of a final plat for a subdivision the engineer or land surveyor who designed the roads shall certify that the roads have been constructed in accordance with the approved plans. If a surety bond or other financial guarantee is provided in lieu of constructing roads prior to approval of the final plat, the financial guarantee shall not be considered to be satisfied until the engineer or land surveyor who designed the roads has certified that the roads have been constructed in accordance with the approved plans.
4) Minimum Private roads proposed to serve lots and/or home sites in subdivisions shall comply with the following minimum design standards in Table 4.2.

Figure 4.5: Typical Street Cross-Section



Source: Stewart

TABLE 4.2: Subdivision Road Requirements

ROAD TYPE	MIN. ROW WIDTH (A)	TRAVELWAY WIDTH (B)	SHOULDER WIDTH (C)
SHARED DRIVE (UP TO 8 UNITS SERVED)	30'	10'	2'
MINOR RESIDENTIAL (9-12 UNITS SERVED)	35'	14'	2'
RESIDENTIAL (13-20 UNITS SERVED)	45'	16'	2'
MAJOR RESIDENTIAL (21-50 UNITS SERVED)	45'	18'	3'
COLLECTOR (OVER 50 UNITS SERVED)	45'	20'	3'

Notes:

- The minimum road right-of-way width shall be increased to the extent necessary to keep all grading and land disturbing activity within the road right-of-way.
- Traffic generated by amenities such as golf courses, restaurants, etc. located within the proposed subdivision shall be considered in determining the appropriate standards for the road(s) serving the development and/or providing access to the amenity. This shall be done by identifying the vehicle trips estimated to be generated by the proposed amenity and relating these vehicle trips to those generated by a single-family dwelling. It shall be assumed that a single-family dwelling generates eight vehicle trips per day. Estimated traffic generation shall be as set forth in the NCDOT Traffic Engineering Manual.
- If the shared drive or minor residential road is more than 500 feet long, a turnout must be provided

as set forth in Section 4.3.5 (c)(i)5) below.

5) *Turnouts*. The turnouts must be a minimum of 50 feet long and provide for a total travelway width of 18 feet with an additional three feet width cleared of trees, brush, and undergrowth. If the turnout is located on the fill side of the road, it shall have a total travelway width of 20 feet with an additional three feet width cleared of trees, brush, and undergrowth. The location of turnouts on shared drives and minor residential roads shall be approved by the Planning Board. Items to be considered in the review of turnout locations shall include the road grade, slope of the bank (if turnout to be located on fill side of the road), width of the turnout, vertical and horizontal curves, and compaction of the subsoil and base as set forth in Table 4.3.

Table 4.3: Grades, Centerline Radius, and Turnouts

Road Section Grade	Road Centerline Radius	Turnout Spacing
≤ 12%	> 90 Feet	700 Feet
≤ 12%	90—70 Feet	600 Feet
≤ 12%	69—60 Feet	500 Feet
≤ 12%	59—50 Feet	400 Feet
≤ 12%	< 50 Feet	300 Feet
> 12%	> 90 Feet	350 Feet
> 12%	90—70 Feet	300 Feet
> 12%	69—60 Feet	250 Feet
> 12%	59—50 Feet	200 Feet
> 12%	< 50 Feet	150 Feet

6) The maximum length for road types shall be as follows:

Table 4.4: Road Length Standards[1]

Shared Drive	2,650 feet (approximately ½ mile)
Minor Residential	5,300 feet (approximately 1 mile)

Residential	10,600 feet (approximately 2 miles)

[1] If the road length exceeds the maximum for that road type, the road shall be constructed to the standards of the next type regardless of the number of homes/lots served.

7) Maximum cut slope: 1 ½:1; maximum fill slope: 2:1. Steeper slopes may be permitted if certified by a professional engineer and approved by the Subdivision Ordinance Enforcement Officer. A bench with a minimum width of 5 feet shall be provided at the toe of all fill slopes greater than 10 feet in vertical height. All cut and fill slopes greater than 20 feet in vertical height shall have a bench with a minimum width of 5 feet for every 10 feet in vertical height. An illustration depicting the benching of cut and fill slopes is available on the County Planning Department website https://www.planning.jacksonnc.org/ and from the Planning Department office.
8) Development access roads in subdivisions with more than 100 lots and/or dwelling units proposed and sections of roads within a subdivision providing access to more than 100 lots shall be constructed to NC DOT subdivision roads minimum construction standards.
9) All lots in a residential subdivision shall abut an access road meeting one of the classifications identified in the Table 4.2: Subdivision Road Requirements.
10) Subdivisions shall abut and be accessed from a public road or have a deeded right-of-way (minimum width of 45 feet) to a public road. If access is provided by a deeded right-of-way, an access road meeting the road construction standards for the number of lots served shall be constructed within the deeded right-of-way.
11) Sections of road, including shared drives, with a grade in excess of 15 percent shall be paved, with the pavement extending 100 feet from the section of road with a grade in excess of 15 percent. The length of road sections with a grade greater than 15 percent shall not exceed 300 feet in length, and a leveling area shall be provided at each end of the road segment with a grade exceeding 15 percent. The grade of the leveling area shall not exceed 12 percent and shall be at least 100 feet in length.
12) The grade of residential roads and major residential roads may be increased up to a grade of 20 percent upon approval of the Planning Board in order to minimize grading and/or vegetation removal. The section of road with a grade in excess of 15 percent shall be paved, shall not exceed 300 feet in length, and a leveling area shall be provided at each end of the road segment with a grade exceeding 15 percent. The grade of the leveling area shall not exceed 12 percent and it shall be at least 100 feet in length.
13) The grade of collector roads may be increased up to a grade of 18 percent upon approval of the Planning Board in order to minimize grading and/or vegetation removal. The section of road with a grade in excess of 15 percent shall be paved, shall not exceed 300 feet in length, and a leveling area shall be provided at each end of the road segment with a grade exceeding 15 percent. The grade of the leveling area shall not exceed 12 percent and it shall be at least 100 feet in length.
14) A two-foot wide shoulder shall be provided on each side of shared driveways, minor residential, and residential roads. A three-foot-wide shoulder shall be provided on each side of major residential and collector roads. The shoulder shall be at approximately the same finish grade as the road bed and shall be compacted to a minimum compaction rating of 95 proctor. Shoulders may be grassed, graveled, or paved.