

June 30, 2017

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Mr. Jeleniewski

Attached is our final report for the Landslide Mapping Project for Jackson County, NC. We have also included the supporting documents with the report. These include:

- Landslide Inventory map GIS files
- Landslide Susceptibility map GIS files
- Project Educational Brochure
- Landslide Maps User's Guide

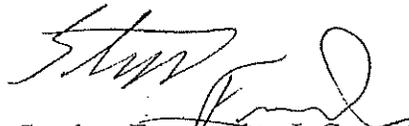
We appreciate the opportunity to work with you on this project. We anticipate working together in the future to continue to promote landslide awareness among the citizens of Jackson County.

Sincerely,

Appalachian Landslide Consultants, PLLC



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*Project Name:* Jackson County Landslide Mapping Project

*Project Start Date:* 11/4/2015

*Project End Date:* 6/30/2016

### *Results*

The Jackson County Landslide Mapping project resulted in completed landslide inventory and susceptibility maps for the County (outside of the Qualla Boundary). The geodatabase inventory includes locations of known landslides and landslide deposits to help users become more aware of where landslides have occurred and what impacts they have had. The inventory includes subsidence points indicating areas that can be repaired before they completely fail and impact slopes and often-times streams below. Database fields indicate the relative potential for future movement, water quality impact upon failure, and public safety impact upon failure. These fields make it easy to sort the database for locations that have the highest likelihood of failing and impacting public safety and water quality, providing prioritization for targeting funding for repair or evacuation during sustained heavy rain events.

The susceptibility maps indicate areas that are more prone to being affected by landslides during heavy rain events. They also include a layer that indicates where care should be taken when planning and building. These maps target user's attention to where they need to take special care when developing to prevent the destabilization of a slope that is near instability in its natural state or may be more likely to fail if not constructed carefully. These maps help to promote the concept of building according to the suitability of the natural resources, which subsequently helps to reduce potential impact to properties, as well as erosion and water-quality impact.

For more information about the features in the landslide inventory and susceptibility maps, see the User's Guide. This guide defines the features and susceptibility areas, and explains what to do if there is a landslide feature or landslide caution area near the area in which the user is interested. It also includes a statement about data and map limitations, as well as where to find more information about landslides.

### *Inventory Statistics:*

- 461 total landslides
  - 187 naturally occurring, 274 on constructed slopes
  - 45 active landslides
  - 79 have an imminent or high potential for future movement
- 22,772 acres of ancient landslide deposits
  - these areas indicate where landslide activity in the past has deposited soil and rock that could become unstable when modified
  - 1434 mapped polygons
- 60 areas of subsidence
  - these can be repaired before catastrophic failure



### Susceptibility Map Statistics:

- 83% of debris-flow type landslides on unmodified slopes are captured within the “Where Debris Flows Might Start” model area.
- 89% of the landslides that start on constructed slopes fall within the Slope Construction Caution Area.

Creation of this inventory brought to light stories of the impact of the 1940 flooding event on portions of Jackson County. Through review of the 1953 air photos, 115 landslide locations were added to the database with a movement date of 1940. These are locations where confidence was high that the feature on the photo was a landslide. Forty-five of these sites were field verified, 36 by ALC and 9 by the NCGS. Seeing these landslide features in the field, as well as speaking to those whose families were impacted by these landslides and floods in the local communities, increased confidence about features seen on the air photos.

### *Outreach*

Creation of the maps is not enough to create awareness, so this project included several outreach and education components, including stakeholder meetings, one-on-one contact, and educational meetings. These outreach and education components helped to increase citizens’ awareness about landslides in Jackson County and how to protect themselves and their investments.

Four stakeholder meetings were held; one at the beginning of the project, and interim update reports to the Planning Board, the Cashiers Planning Council, and the Cullowhee Planning Council. These meetings involved stakeholders from local municipalities, county government, local real estate professionals, local business owners, and others. ALC also gave a presentation to the Cashiers Valley Rotary club about the landslide mapping.

During field work for the project, ALC talked to 65 property owners and handed out brochures about the project.

In February, 2016, ALC submitted press release to several media outlets. The project got press coverage from:

- Smoky Mountain News
- The Highlands News – “Native Highlander part of team to map JC landslides”  
<http://www.highlandsinfo.com/PDFs/16mar3.pdf>
- The Mountaineer – “Jackson Landslide Mapping Kicks Off”
- Mountain Express – “Jackson County begins landslide mapping project”  
<http://mountainx.com/blogwire/jackson-county-begins-landslide-mapping-project/>
- WLOS News 13 – “Jackson County invests in landslide mapping”  
<http://wlos.com/news/local/jackson-county-invests-in-landslide-mapping>

In February, 2017, ALC contributed photos and information for an article about the landslide mapping in the Sylva Herald, published February 22, 2017.



ALC also wrote a professional paper for the 3<sup>rd</sup> North American Symposium on Landslides, held in Roanoke, VA in June, 2017. The reference for this paper is Bauer, J.B., Fuemmeler, S.J., (2017) The Science and Stories of Landslide Inventory and Susceptibility Mapping in Haywood and Jackson County, North Carolina, USA, In De Graff, J.V. and Shakoor, A. (eds.), Landslides: Putting Experience, Knowledge and Emerging Technologies into Practice, AEG Special Publication No. 27, p. 675-686.

#### *Future work*

After initial review of the data by Jackson County staff, ALC will post the User's Guide and maps on the online map viewer at: <https://appalachianlandslide.com/landslide-hazard-maps/>. ALC will also work with County GIS personnel regarding online map distribution.

At least one final meeting will be held to present these results to County Commissioners, planning board members and other stakeholders in the future. In order for the maps to be understood and used effectively, ALC will facilitate a workshop on using the online landslide maps. ALC will also continue to work to increase awareness of the mapping through an additional press release. With a continued presence and communication efforts about how to effectively use this mapping, the citizens of Jackson County can be informed and prepared for the next landslide-triggering rain event.