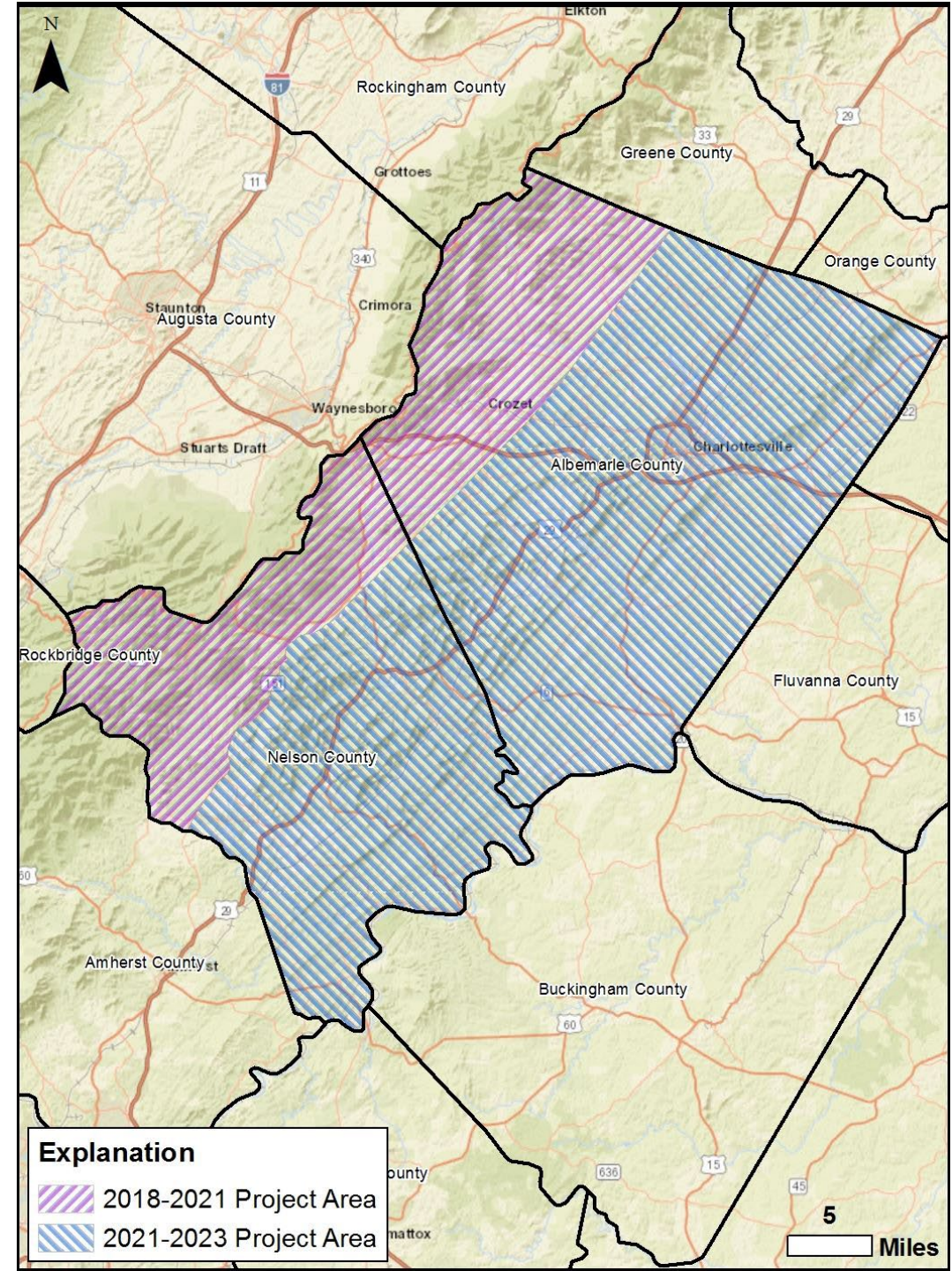


# VDEM-FEMA Pre-Disaster Mitigation Grant Projects in Nelson & Albemarle Counties:

## Western Landslide Risk Assessment (2018-2022) Eastern Landslide Risk Assessment (2021-2023)

- Virginia Energy received grant funding from FEMA-VDEM in August 2018
- \$85,500 FEMA grant funds, Virginia Energy provides \$28,500 in matching funds = TOTAL: \$114,000
- Goal: Complete a landslide hazard map for western Nelson and Albemarle Counties to identify at-risk properties and infrastructure by March 2021
  - Grant deadline was extended to March 2022 due to COVID
- Geologic field work completed between Fall 2019-Spring 2020



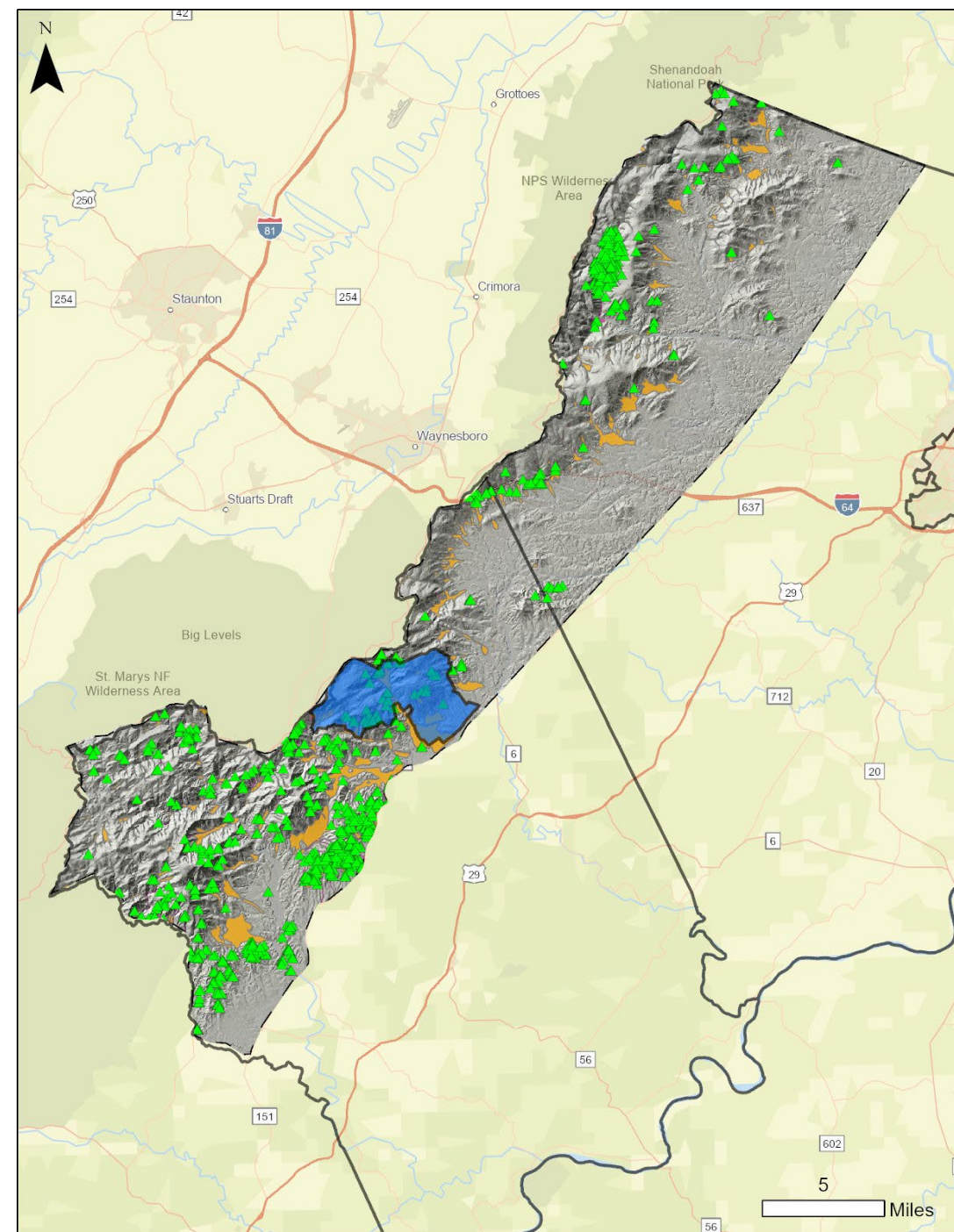


# VDEM-FEMA Pre-Disaster Mitigation Grant Projects in Nelson & Albemarle Counties:

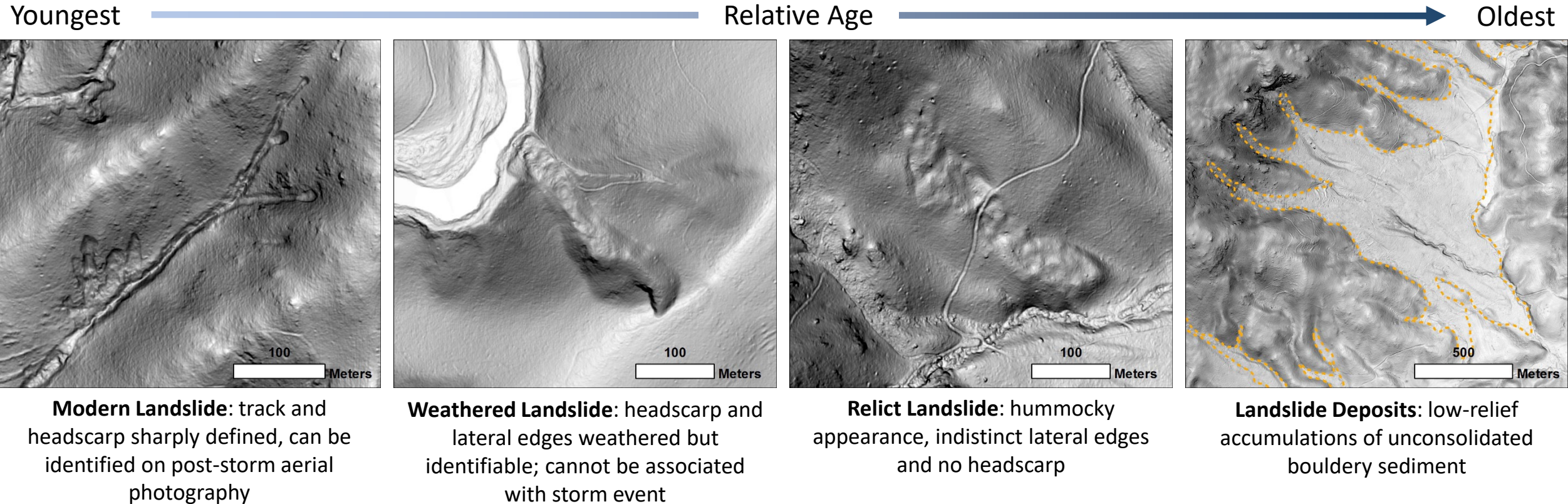
## Western Landslide Risk Assessment (2018-2022)

First landslide project in Virginia to use high-resolution 1-meter LIDAR data

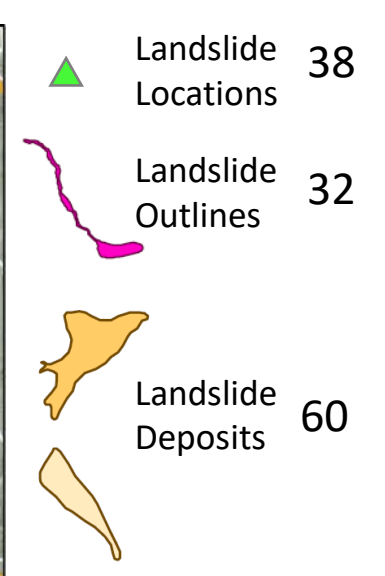
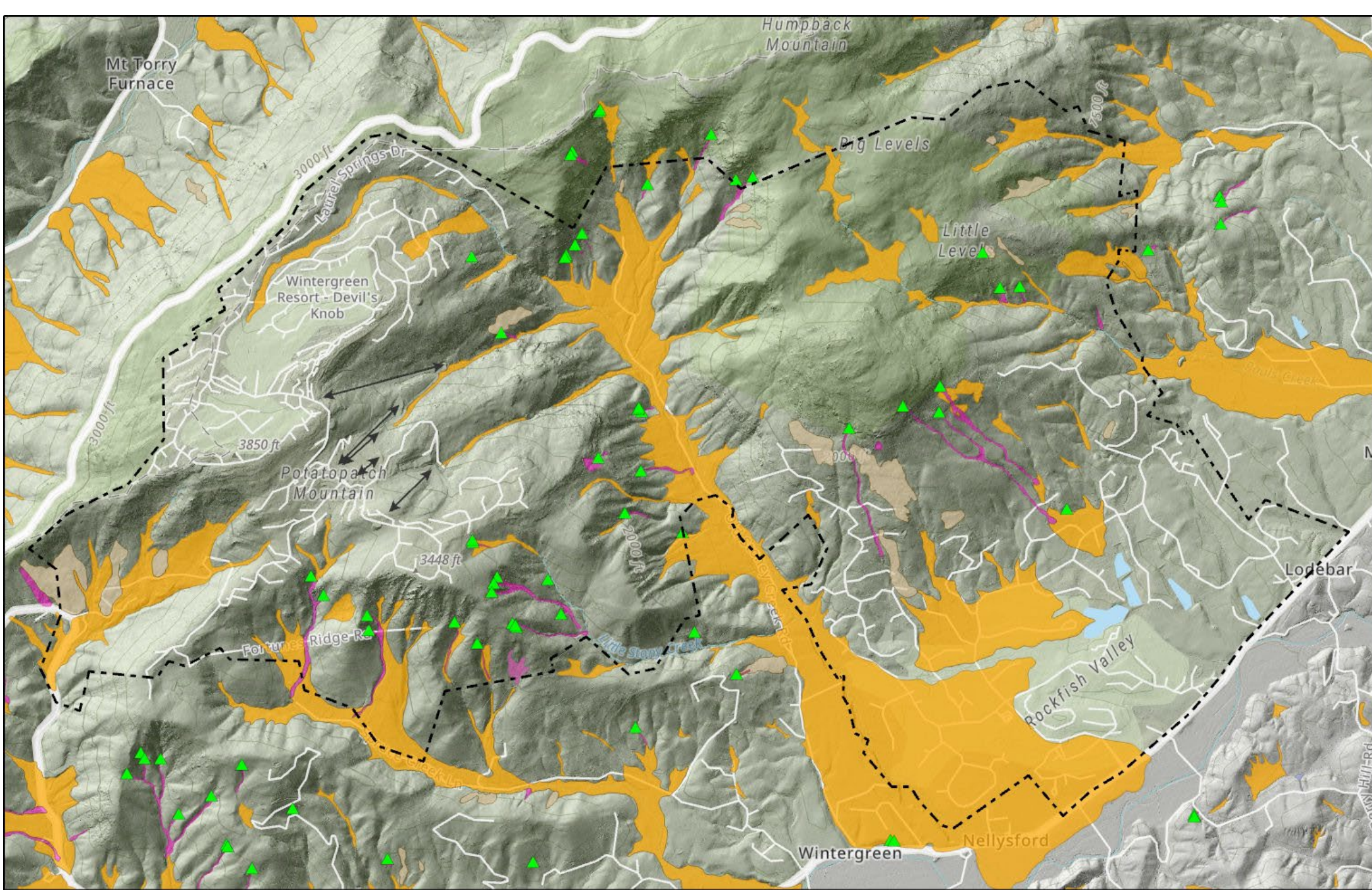
- Current study results – Western Project:
  - Landslides identified: 979
  - Hurricane Camille 1969: 680 (> 6000 for entire storm area)
  - June 27, 1995 Storm: 187
  - Landslides field verified by a Virginia Energy geologist: 170 (17%)
- Landslide outlines (tracks): 577
  - 149 Weathered or Relict Landslides
- Ancient landslide deposits: 1017



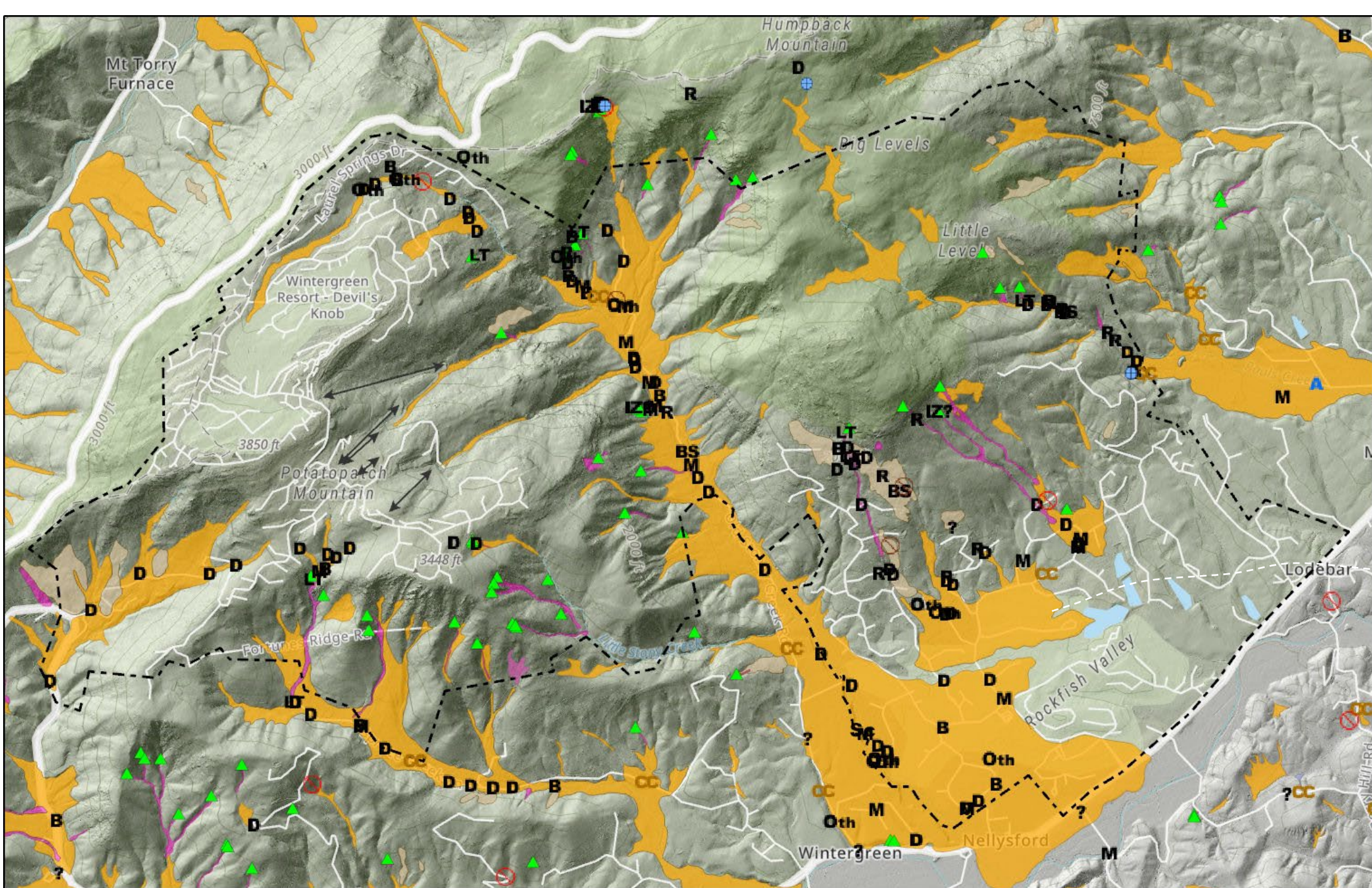
# Landslide Identification Using LIDAR








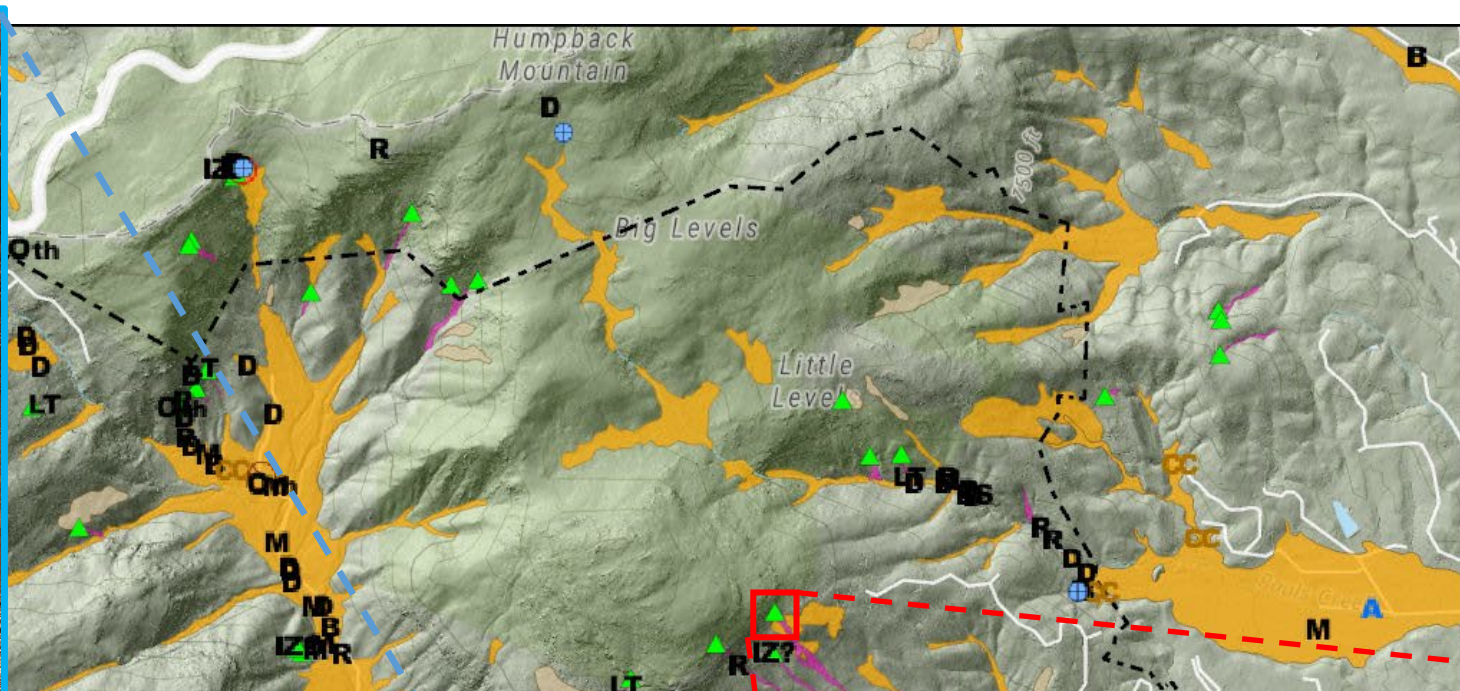









-  Landslide Locations 38
-  Landslide Outlines 32
-  Landslide Deposits 60
- Field Notes = 126
- Collected data at 10 landslides headscarps

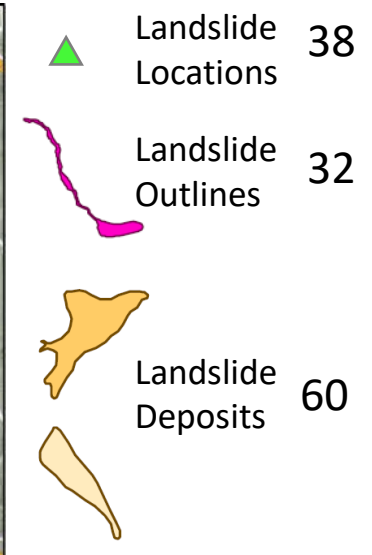
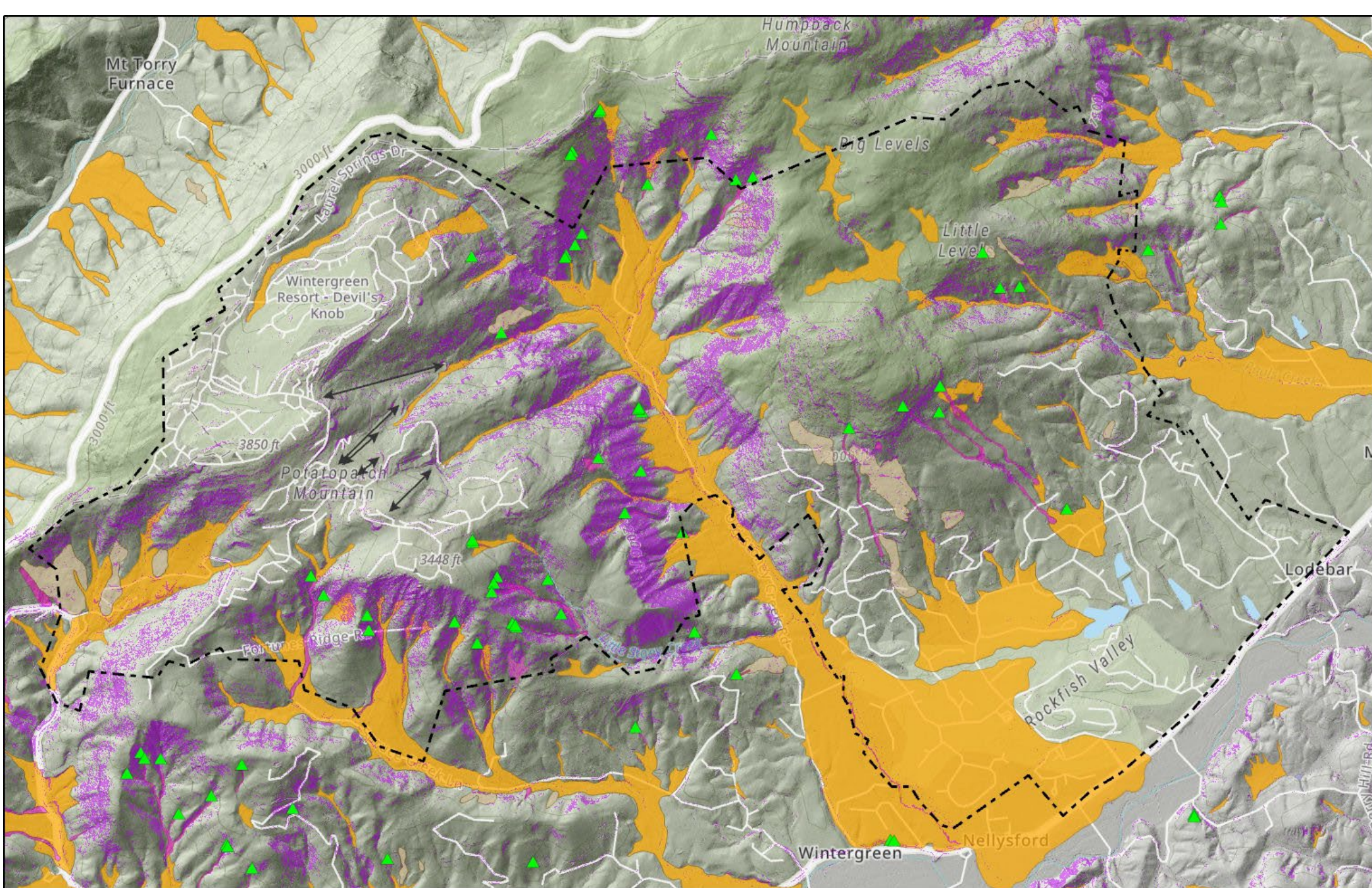




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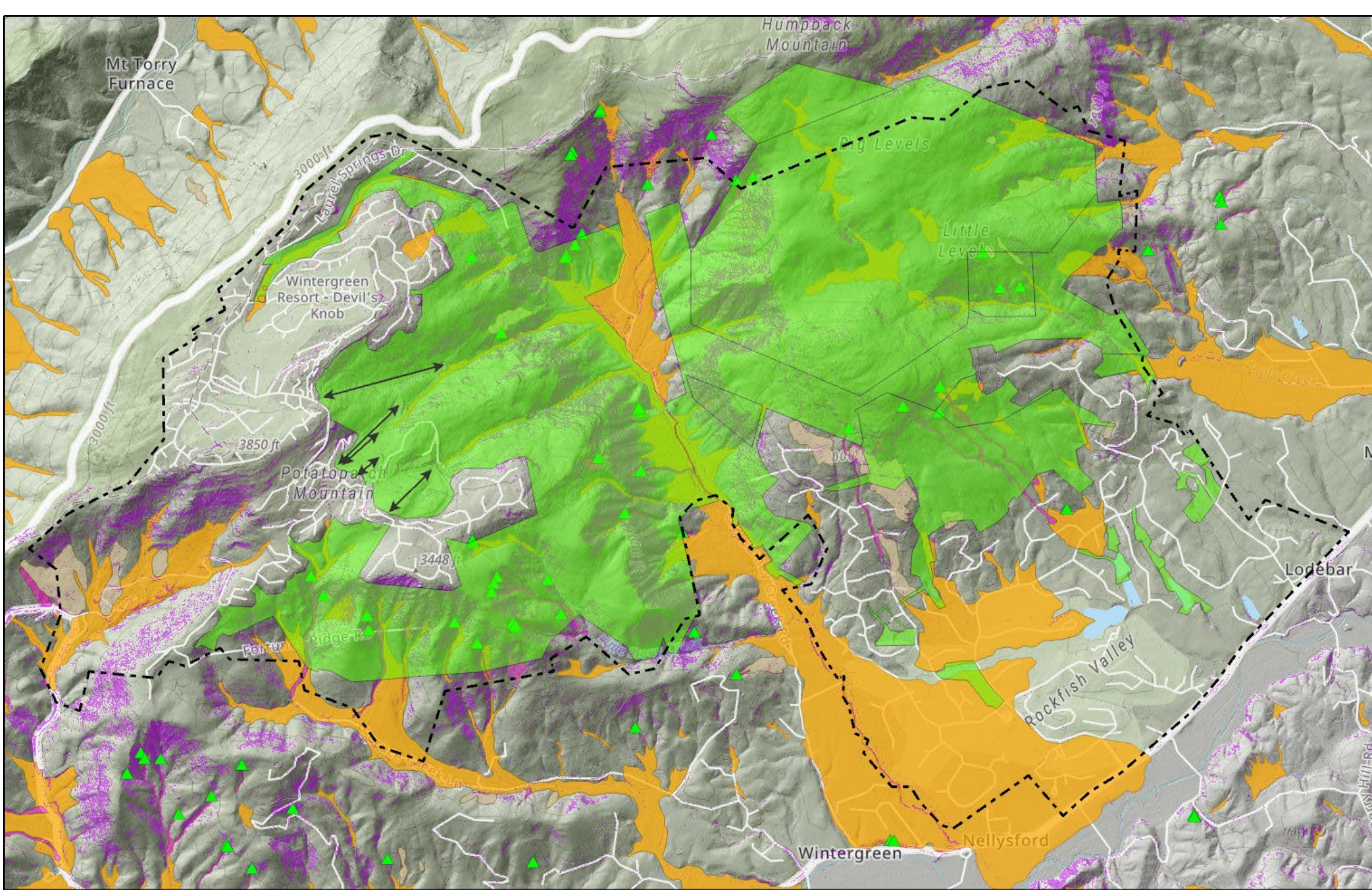







Field Notes = 126

Slope = Majority  
(80%) of landslides  
start on slopes  $\geq 30^\circ$





-  Landslide Locations 38
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Field Notes = 126

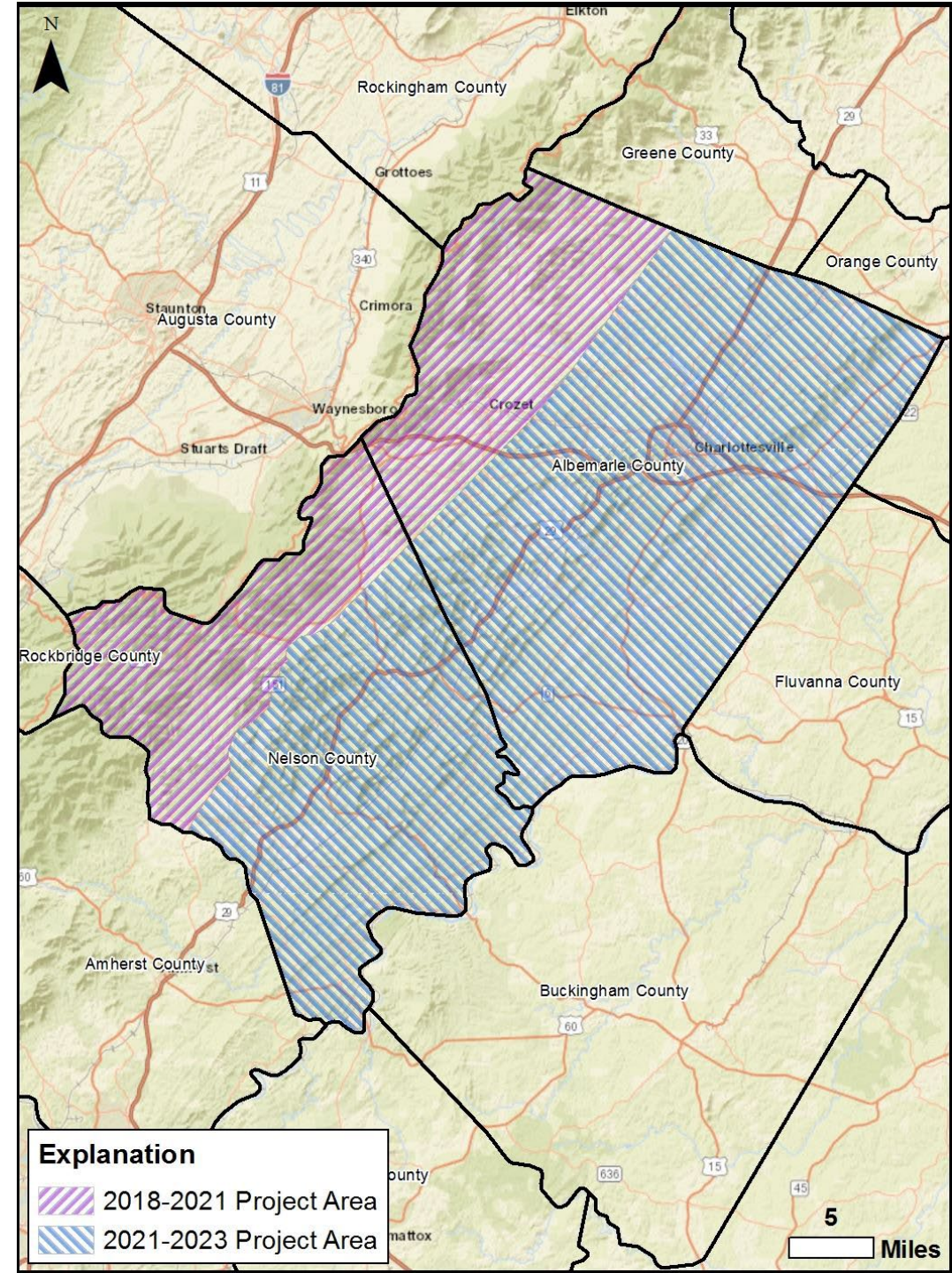
Slope = Majority  
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# VDEM-FEMA Pre-Disaster Mitigation Grant Projects in Nelson & Albemarle Counties: Western Landslide Risk Assessment (2018-2022)

## Key Deliverables for March 2022

1. GIS data layers and 3 digital maps showing at-risk areas:
  - Landslide Inventory Map
  - Landslide Susceptibility Map
  - Landslide Pathway Map
2. Recommendations for planners, emergency management, and the public
3. Spatial data will be available to the public on the project website





# How to Use Landslide Maps

## 1 Landslide Inventory Map → WHERE HAVE LANDSLIDES OCCURRED?

These maps identify landslide features within an area including ancient deposits that are up to millions of years old as well as modern landslides:

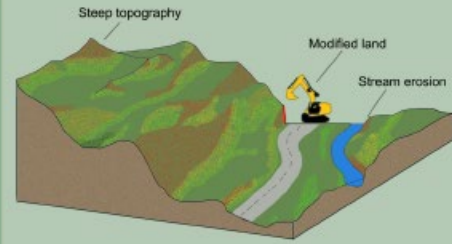


**LANDSLIDE DEPOSITS** are large volumes of clay, silt, sand, and rocks that have accumulated over time as a result of multiple prehistoric landslide events.

**LANDSLIDE LOCATIONS** are places where modern landslides start before sliding or flowing downhill.

**LANDSLIDE OUTLINES** are the boundaries of recent landslides. Most of these landslide outlines are tracks of debris flows, but also include other types of slope movements like slides or falls.

## 2 Landslide Susceptibility Map → WHERE COULD LANDSLIDES START?



These maps identify areas that may be at greater risk of failure during a significant rainfall event. Stability or susceptibility maps typically depict areas of steepest topography, however, many additional factors influence where a landslide may initiate. Aspect, geology, degree of fracturing, vegetation, and soil type and thickness can all be significant.

Slopes are more susceptible to failure in areas affected by clearcutting, stream erosion, or site development. Such activities may cause reduction of soil cohesion or oversteepening of slopes resulting in a greater risk of failure.

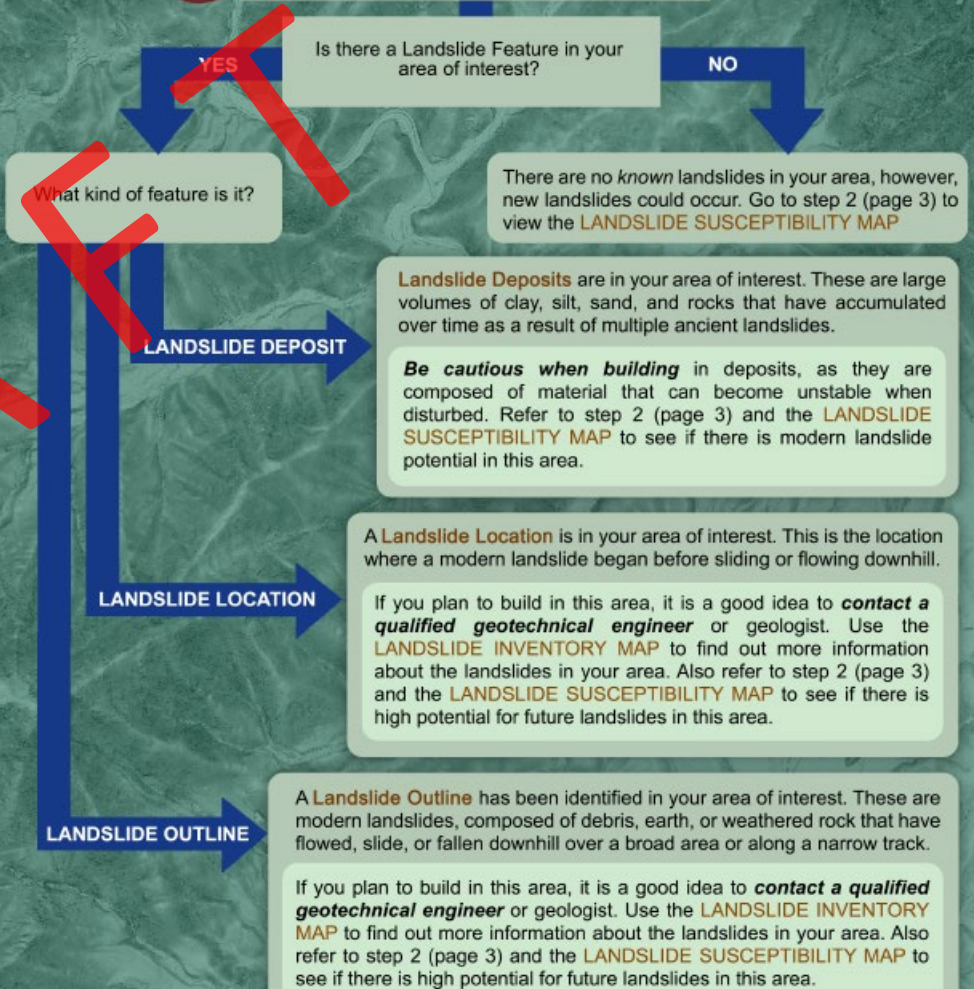
## 3 Landslide Pathway Map → WHERE COULD LANDSLIDES GO?



These maps identify the potential pathways if landslides were to occur during an extreme storm event. Landslides typically follow a path of least resistance downhill, such as a valley or drainage. Once a landslide encounters shallow topography, such as a flood plain, the material can spread outward covering a broader area.

# What Should a Property Owner Do?

## 1 Begin with the Landslide Inventory Map





# Contact Information:



**Virginia Department of Energy**  
*Geology and Mineral Resources Program*

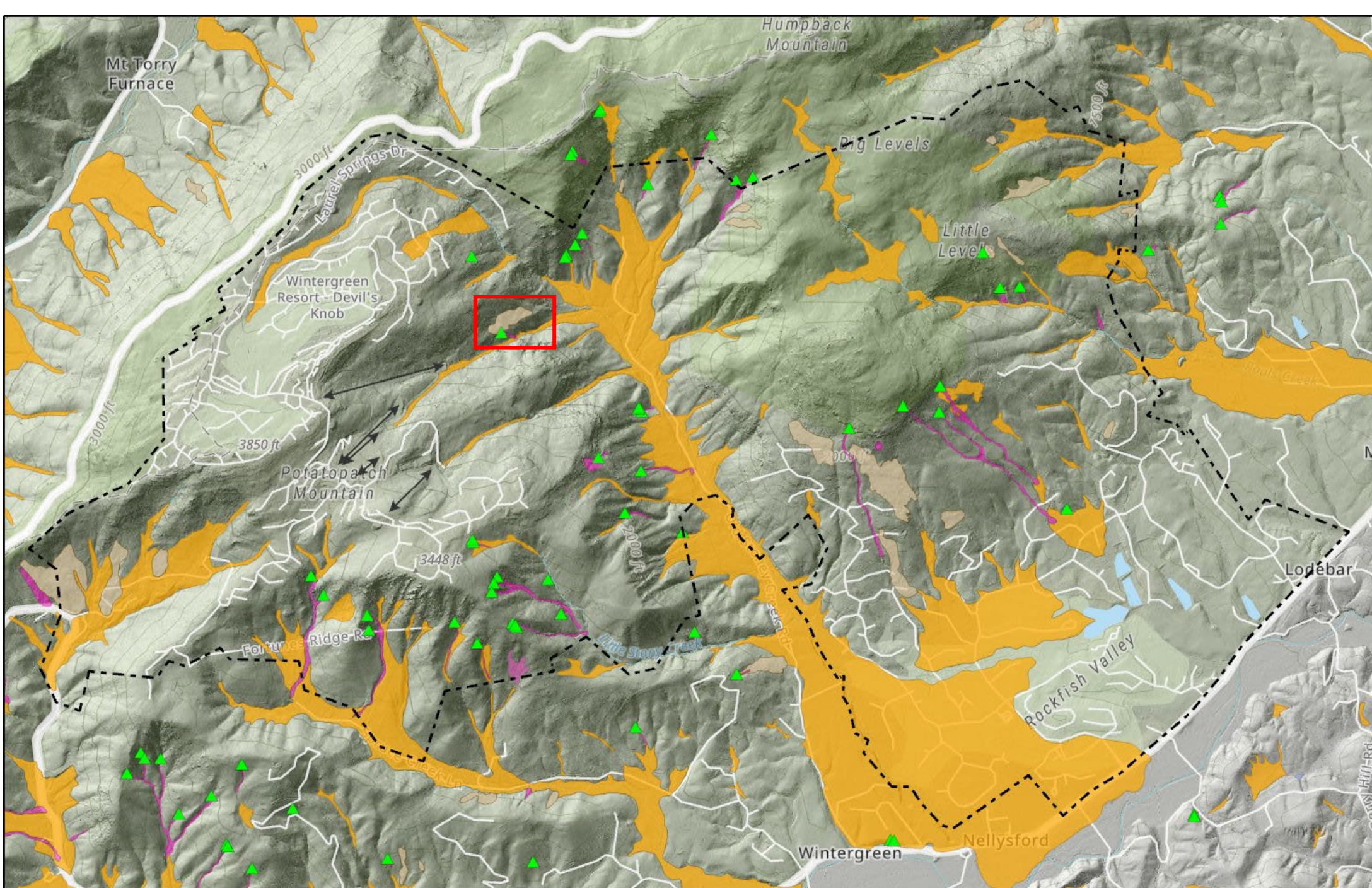
Anne Carter Witt: Project Coordinator  
434-951-6319





[anne.witt@energy.virginia.gov](mailto:anne.witt@energy.virginia.gov)

Matt Heller: Program Manager  
Wendy Kelly: Contract Geologist

[https://energy.virginia.gov/geology/FEMA\\_landslide.shtml](https://energy.virginia.gov/geology/FEMA_landslide.shtml)



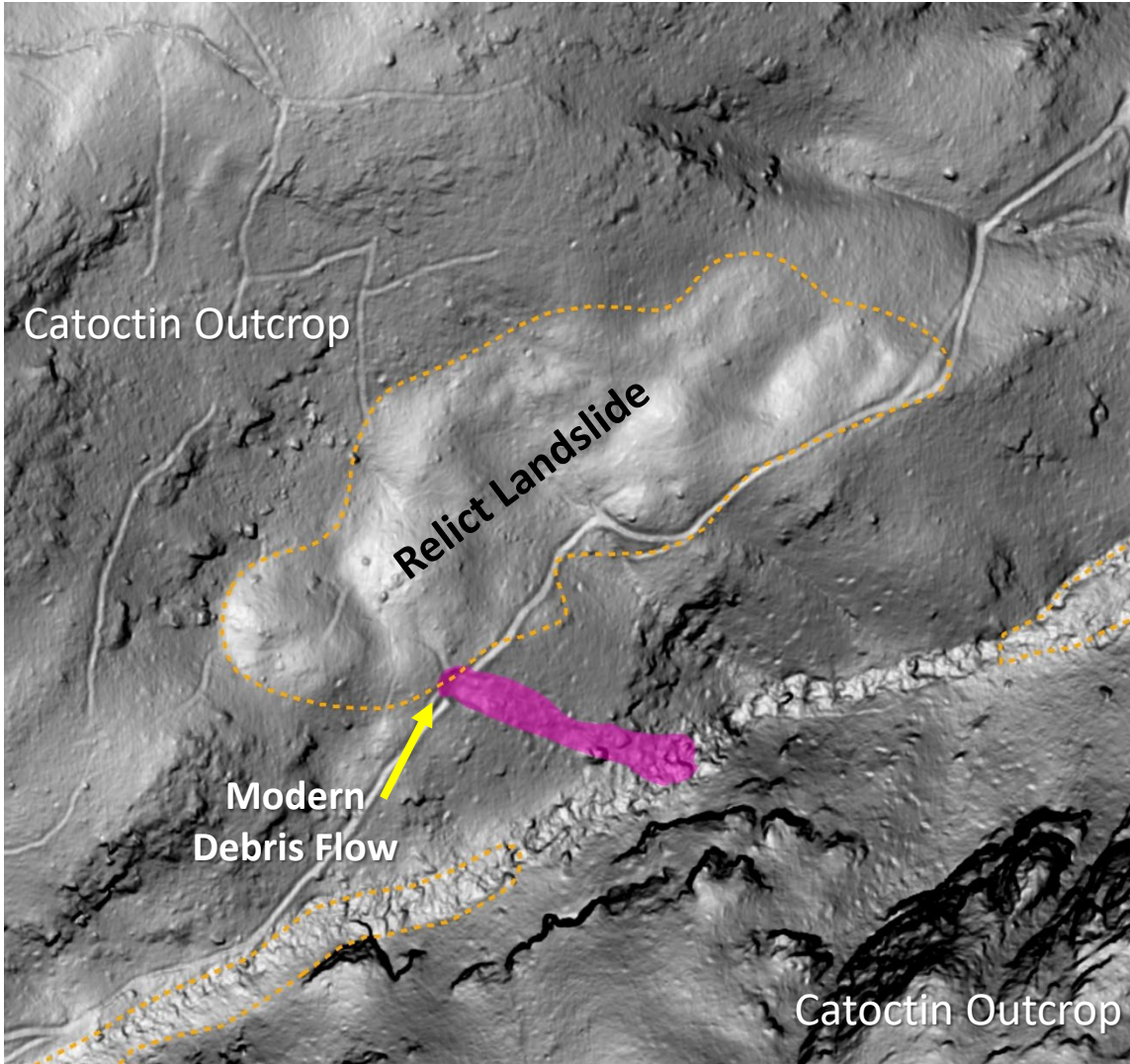


-  Landslide Locations 38
-  Landslide Outlines 32
-  Landslide Deposits 60
-  Relict Landslides

Field Notes = 126

Slope = Majority  
(80%) of landslides  
start on slopes  $\geq 30^\circ$





# Relict Landslides

- Remnants of several generations of downslope movement
- All evidence of scarping and lateral boundaries have been weathered away over geologic time, leaving a hummocky surface exposure
- Sometimes occur below a cliff face or outcrop source
- Primarily found in areas underlain by Catoctin metabasalt
- Primary concern is for construction and initiation of new landslides