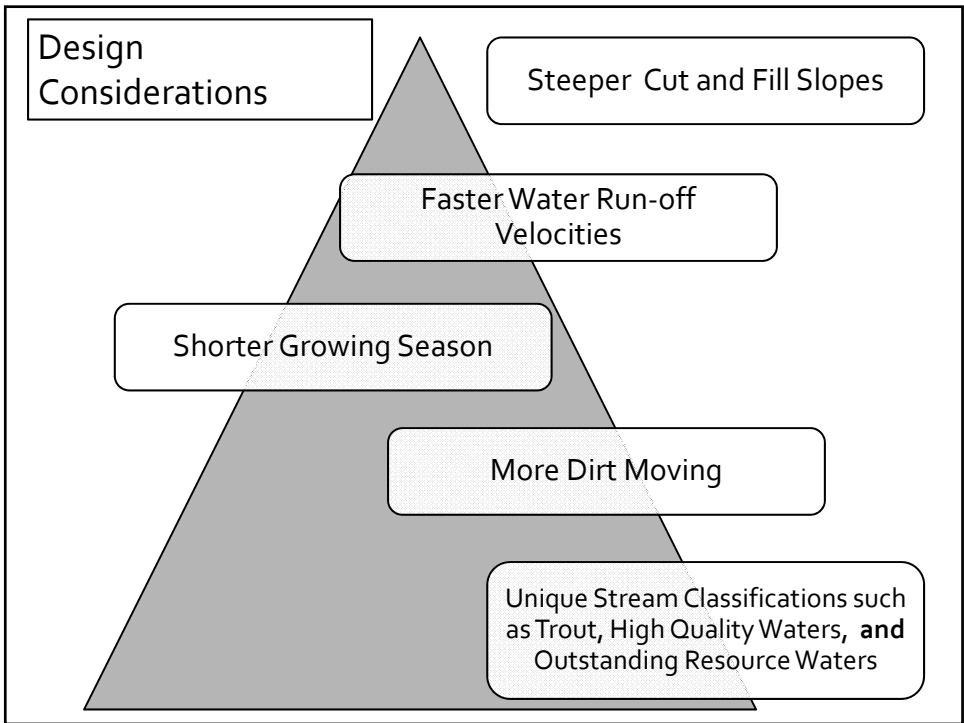
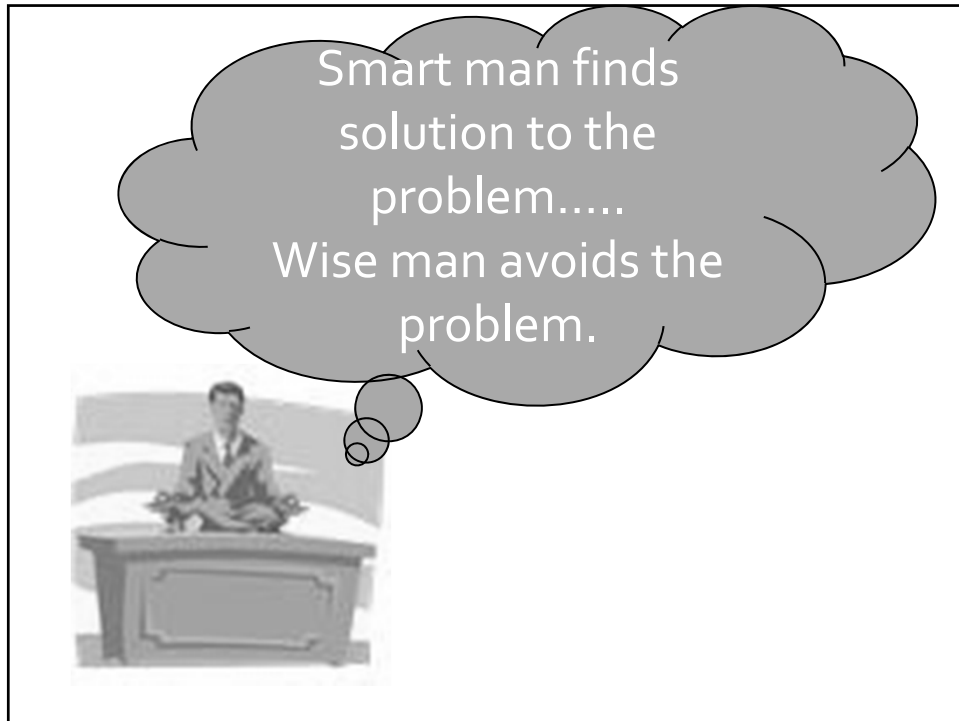


Mountains and Mud

Laura Herbert, PE
ARO Regional Engineer
DEMLR, LQS, ARO

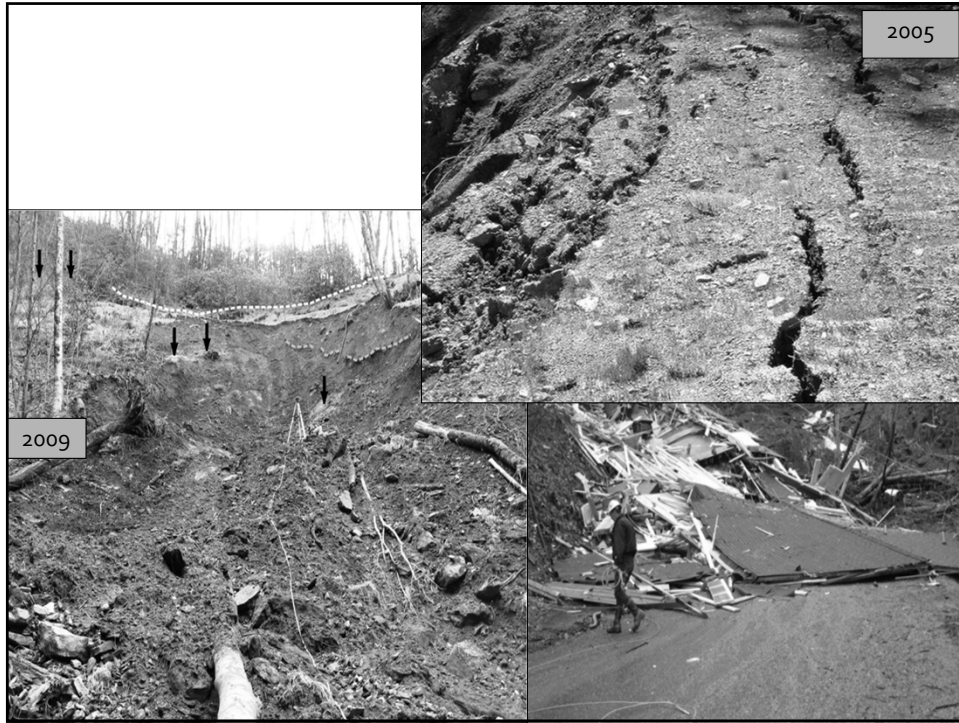
**EROSION CONTROL
PLANNING
CONSIDERATIONS FOR
WESTERN NC**





AVOID THE PROBLEM

"Mud Does Not Wait"
– Earl Davis, Guilford County

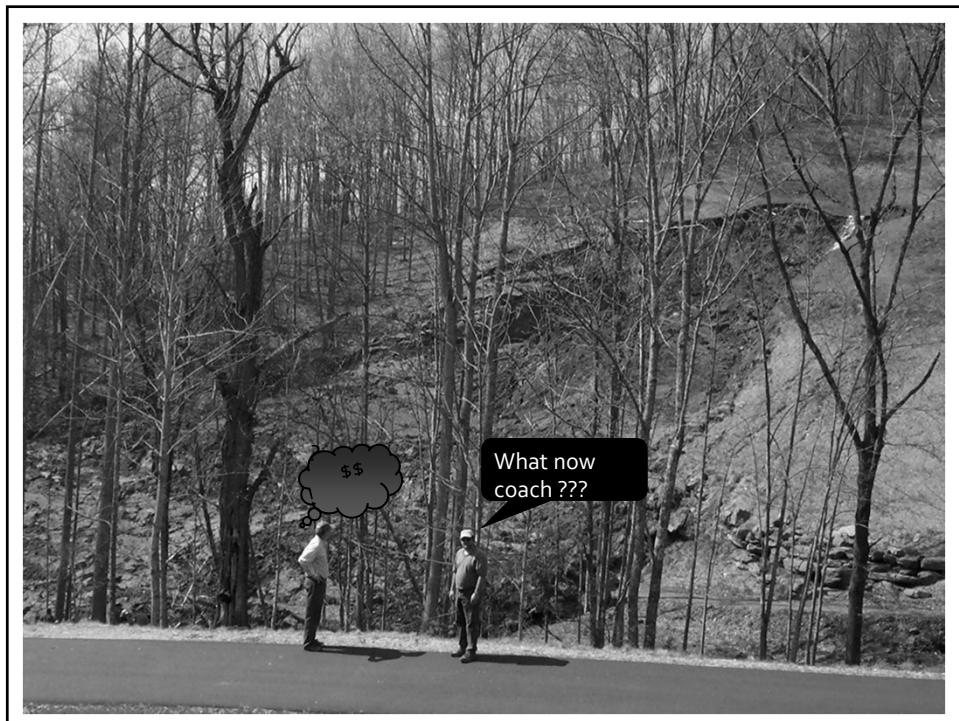


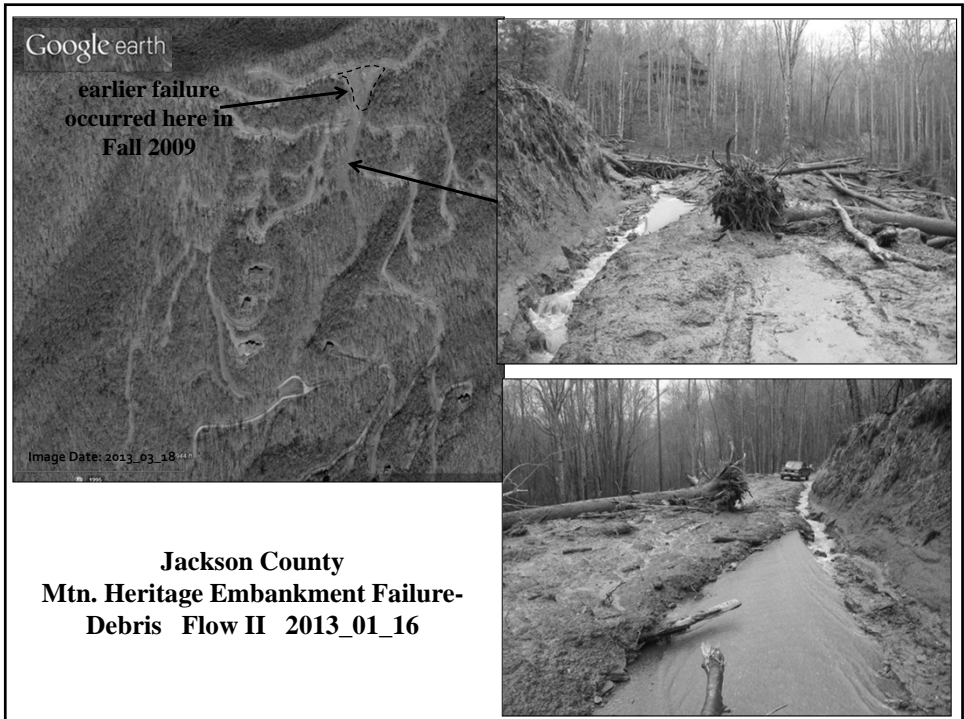
Ghost Town-Rich Cove
Retaining Wall Failure – Debris Flow
Feb. 5, 2010 ~ 6:28 p.m. Maggie
Valley, Haywood Co.

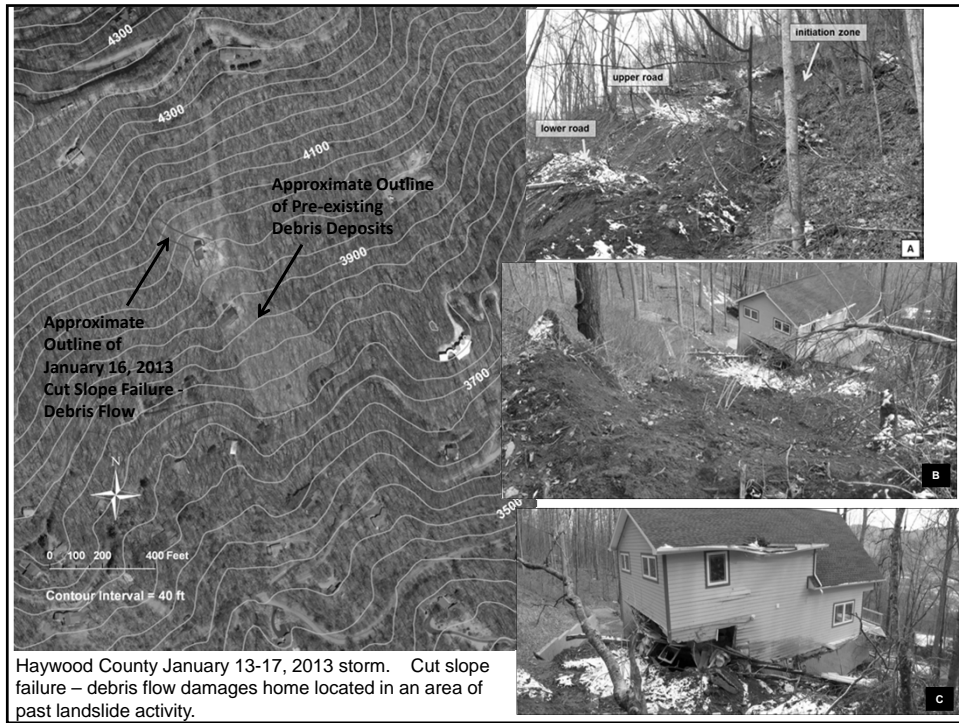
- 3,000 ft-long track
- 25,000 cubic yards of debris
- 3 homes damaged
- NCDOT Road damaged & blocked
- ~\$1.1+ million EWP grant to stabilize slope at Ghost Town

Snow: ~8" Jan 29-30
Rain: ~1.2" Feb.

It takes less rainfall to trigger a debris flow on a modified slope (with evidence of prior instability), than on an unmodified slope







Don't Forget THE Principles

- Fit development to the site.
- Grade to minimize cut and fill slopes.
- Preserve natural buffer areas.
- Limit the time that bare soil is exposed.

- That said.....

Steeper Cut and Fill Slopes

- Slope Design and Construction
- Runoff Protection
- Stabilization and Maintenance

Slope Design and Construction

No more than 2:1 and limit length of slope

- Geotechnical Design/Retaining Walls If Steeper
- Slope Breaks or Benches (for 2:1 every 20 Feet)
- Existing Topography (LIDAR, On the ground surveys)
- Existing Site Conditions and Any Geologic Hazards

Buffers

- Adequate Buffers to Other Property and Streams
- No Fill Adjacent to Channel Banks

Construction

- Topsoil Reuse and Roughened Surface
- Clean Fill - No Debris, Stumps, Rocks, Logs
- Layered Fill \leq 9 inches layers and compacted
- All Seeps or Springs Handled in Construction – No Water in Fill Slopes
- Sediment Controls before Slope Construction.
- Access to Sediment Basins/NOT Across Fill or Cut Slopes

Geohazards and Landslide Mapping Website

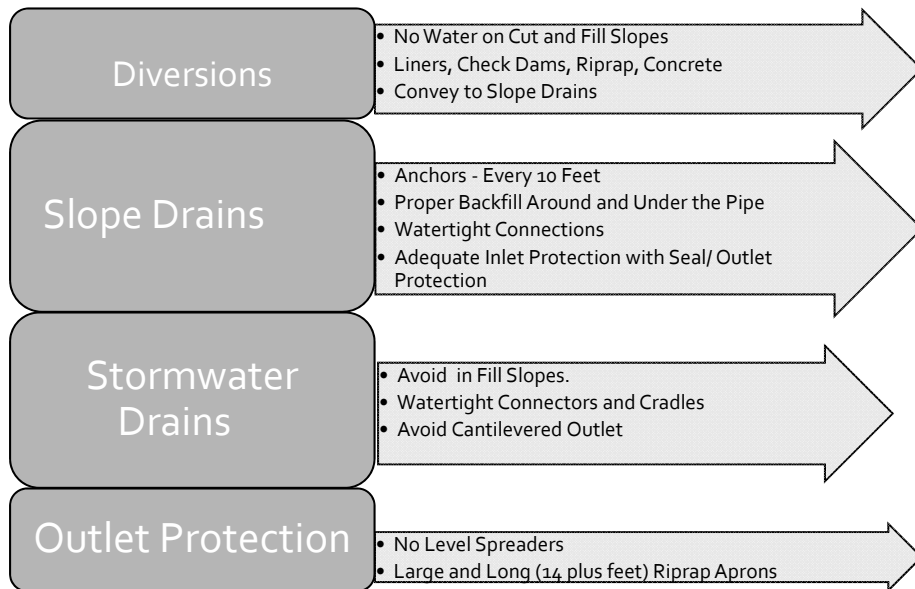
Map Layers:

- Landslide Point Locations
 - Landslide Locations (Visible between 1:100,000 and 1:4,000)
 - Critical Features
- Roads
- Administrative Layers
- Water Features
- Landslide Area Features
 - Recent Debris Flow Pathways (Tracks) (Visible between 1:100,000 and 1:4,000)
 - Slope Movement Deposits (Visible between 1:100,000 and 1:4,000)
 - Landslide Hazard Analysis (Modelled)
 - Debris Flow Pathways (Visible between 1:100,000 and 1:4,000)
 - Slope Stability Index Map (Estimated) (Visible between 1:100,000 and 1:4,000)
- Imagery and Elevation

Steep Slope Ordinances

- Buncombe County
 - City of Asheville
- Haywood County
- Jackson County
- Town of Boone
- Polk County Considering?
- Henderson County Considering?

Runoff Protection

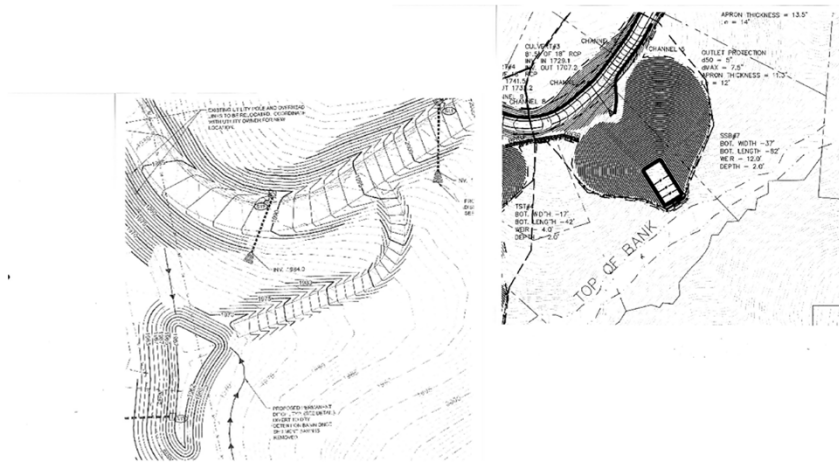


Stabilization and Maintenance

- October to April – Mat immediately!
- Test soil – Amendments/Lime is cheaper than fertilizer.
- Next Spring – Top dress with fertilizer.
- Rye Grain NOT Rye Grass.
- Prep soil (Can't hydroseed a brick!)
 - Roughen/loosen top layer/seed and mulch immediately.

Stabilization and Maintenance

- Sediment Basin/Trap Access NOT across slope.



Other Considerations

- Silt fence inadequate below long, steep slopes
 - Super Silt Fence vs. Ordinary Silt Fence

	PENN Design Manual	Table 6.62a - NC Design Manual	
	Super Silt Fence (1)	Regular Silt Fence	Regular Silt Fence
Slope	Slope Length (ft)	Slope Length (ft)	Maximum Area (ft ²)
< 2 %	1,000	100	10,000
2 to 5 %	500	75	7,500
5 to 10 %	300	50	5,000
10 to 20 %	200	25	2,500
30%	100	15	1,500
40%	75	15	1,500
50%	50	15	1,500

(1) Slope length may not be increased by use of multiple rows of Super Silt
 Pennsylvania Design Manual 363-2134-008/ Silt Fence off Toe of
 Slope for Maintenance.

Other Considerations

- Geothermal Well Drilling
 - Sediment basins/traps have to be sized accordingly
 - Potentially large amounts of discharge
 - Measures in place during test well drilling

- Construction and E&SC Phasing
 - Perimeter measures prior to any disturbance
 - Stormwater system NOT available immediately
 - Stormwater system NOT for conveying sediment
 - Site stabilized before conversion of sediment basins to stormwater systems

Moving Dirt

- If moving dirt off-site (waste) or on-site (borrow):
 - All borrow/waste sites need to have an approved erosion control plan or be regulated as a mining operation.
(15A NCAC .04B .0110)

You might be MINING if

- More than one off-site location for waste; or
- Greater than 5 acres; or
- More than one year duration; or
- Borrow/waste site doesn't have an approved erosion control plan; or
- Blasting, removing materials from river, off-site waste on affected land; surface disposal of groundwater off-site; or
- In violation of local ordinances

(The Mining Act of 1971 – Chapter 74-, Article 7, 74-49.
Definitions – (7)(d) and (f))



Special Water Classifications/Buffers

- Trout Buffers
- High Quality Waters
- Outstanding Resource Waters
- WS-I thru IV
- Catawba/Tar Pamlico/Neuse
Buffers

Trout Buffers

Local Programs have the authority and the responsibility for trout buffers.

Trout buffer variances only issued by NCDENR/DEMLR –
Ashley Rodgers, NC
Sedimentation Specialist.

Just Because You Don't See Trout...Always Check the DWR Classification

- 25 Feet from Top of Bank – Stay out of it!
- Can disturb up to 10 % linear footage owned, not to exceed 100 feet in any 1000 linear feet.
- If plans to disturb more, need a variance from DEMLR (Ashley Rodger) BEFORE you can issue an approval for the E&SC plan.
- Call Ashley Rodgers at (919)707-9215 for details.

High Quality Water (HQW) (15A NCAC .04B .0124)

- 20 acres disturbance limit at any one time on the tract
- Control measures designed to a 25 year storm
- Within one mile and draining to HQW (one acre or more) – Need State Stormwater Permit with minimum buffer of 30 feet setbacks (call LQS Regional Office and/or Bradley Bennett– SW – (919)807-6378)

Outstanding Resource Waters(ORW)

- Draining to ORW (one acre or more) –
Need State Stormwater Permit with
minimum buffer of 30 feet. (call LQS
Regional Office and/or Bradley Bennett–
SW – (919)807-6378)

Other Buffer Rules (15A NCAC .02B .0243)

- Call Regional Office of Division of Water
Resources .

Questions?

- Laura Herbert
- Laura.herbert@ncdenr.gov
- (828)296-4500
- Asheville Regional Office, LQS
- 2090 US Highway 70
- Swannanoa, NC 28778

Resources

- Water Classifications:
 - <http://portal.ncdenr.org/web/wq/ps/csu/classifications>
- North Carolina Design Manual:
 - <http://portal.ncdenr.org/web/lr/publications>
- Geohazards and Landslide Mapping:
 - <http://portal.ncdenr.org/web/lr/landslides-information>
- NC Floodplain Mapping
 - <http://www.ncfloodmaps.com/>
- Pennsylvania Design Manual
 - <http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-88925/363-2134-008.pdf>