Erosion & Sediment Control for Linear Utility Operations

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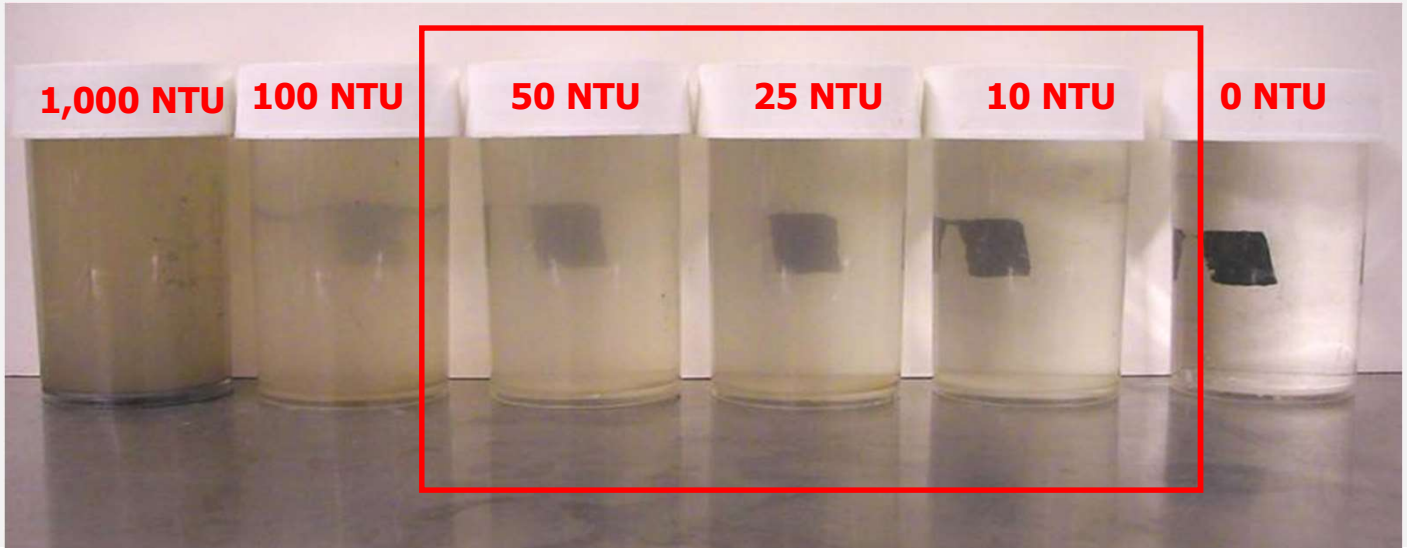
Ted's Top Ten

10. Never place temp E&SCs in jurisdictional streams or wetlands, unless..
9. Consider turbidity curtains where water impoundments occur downstream
8. Detail management of OTHER construction site pollutants
7. Avoid long runs of silt fence w/out designed breaks/outlets w/sed traps
6. Insist on adequate LOD for staging/stockpiling areas & sediment storage
5. All basins/traps require coir fiber baffles
4. Detail anchor trenching on erosion control matting
3. Specify biodegradable rolled or hydraulic EC product in ESAs
2. Utilize PAMs to provide additional treatment for turbidity reduction
1. Plan to address Inadvertent Returns from Horizontal Directional Drilling

Objectives

- Build Margin into the E&SC Plan Design
- Emphasis on protection at Environmentally Sensitive Areas (ESAs)



Environmentally Sensitive Areas (ESAs)

- Areas requiring special protection during construction
- Designate the ESA with a 50' "MARGIN" on each side of resource

- Wetlands
- Surface Waters
  - Streams
  - Ponds
  - Lakes
- Riparian Buffers
- High Quality Waters (HQW)
- Outstanding Resource Waters (ORW)
- Water Supply Watersheds (WSW)
- Trout (Tr) Buffer Zones
- Critical Areas (CA)
- Section 303(d) Waters listed for Turbidity Impairment
- Coastal Areas of Environmental Concern (AEC)
- Threatened and Endangered (T&E) Species and Habitat

Terminology

- Construction stormwater management
  - Implementation of temp & perm erosion & sediment control BMPs during the construction phase of a project
- Erosion Controls
  - BMPs that minimize the detachment phase of erosion
- Sediment Controls
  - BMPs that minimize the transport and deposition phase of erosion
- Erosion Control Plan (EC Plan) or….

  Erosion and Sediment Control Plan (E&SC Plan)

Common E&SC Plan Implementation Issues

- Operating outside Limits of Disturbance (LOD)
- Perimeter BMP failures at ESAs (wetlands and streams)
- Insufficient BMPs to contain or control sediment on linear utility jobs

ESA Non-structural BMPs for the E&SC Plan Narrative

- Clearing and Grubbing
  - Only clearing, not grubbing, until immediately prior to any grading
  - Implement BMPs after clearing or concurrent with grubbing

ESA Non-structural BMPs for the E&SC Plan Narrative

- Temporary Stream Crossings
  - Permitted
  - Single span bridge or
  - Culverted w/clean backfill
  - Installed prior to grading

ESA Non-structural BMPs for the E&SC Plan Narrative

- Grading
  - Once grading begins, progress in a continuous manner until completed and stabilized...in stages
  - No start and stop or hop scotch

ESA Non-structural BMPs for the E&SC Plan Narrative

- Staged Seeding
  - Establish groundcover on slopes (cuts/fills)
  - No more than 10’ in height measured along the slope
  - No more than one acre of exposed erodible slope area

ESA Non-structural BMPs for the E&SC Plan Narrative

- Seeding and Mulching/Hydroseeding
  - Immediately following final grade establishment
  - No appreciable time should lapse w/out stabilization of…
  - Slopes
  - Conveyances or
  - Other areas in the ESA

HOW ABOUT CONSTRUCTION PHASING CONSIDERATIONS?

ESA Construction Phasing for the E&SC Plan Narrative

- Clearing and Grubbing (C&G)
  - Access Roads
  - Provide and designate adequate LOD
  - Prior to C&G, designate ESAs with highly visible flagging or fencing
  - Implement perimeter controls before and/or concurrent w/C&G
  - Regulators consider tree cutting a land disturbing operation (canopy removal)
  - Develop a C&G E&SC plan sheet(s)

ESA Construction Phasing for the E&SC Plan Narrative

- Grading
  - Implement intermediate controls upgrade of perimeter devices
  - ESA exposed areas idle for >7-14 days must be stabilized
  - Provide narrative/details for
    - any dewatering of ESA work areas
    - any temporary culvert work in ESA
  - Provide narrative for stockpile management
  - Develop Intermediate E&SC plan sheet(s)

ESA Construction Phasing for the E&SC Plan Narrative

- Final Grade Phase
  - Demob narrative for large sediment basins or similar
  - Coordination with any structural post-construction stormwater BMPs
  - At 70-80% perm veg phase, remove ALL temporary BMPs…. or as soon as practical
  - Develop final grade E&SC plan sheet(s)

E&SC Phasing and Narrative Tips

- Notify regulator of start date and job contacts
- Avoid cut/paste
- Anticipate contractor's plan of work
- A critical component of the plan often unused as such

BMPs allowed in ESAs

- Note that EXCAVATED BMPs disallowed
- Design structural BMPs for the Q25 storm

Table 3-1 - Allowed BMPs for Environmentally Sensitive Areas

BMP	HQW/ORW /WSW/CA	Trout	Riparian Buffers	303(d) for Turbidity	Wetlands	T&E Species
Rock Dam	✓	✓	✓	✓	✓	✓
Rock Dam with Sediment Trap	✓	✓	☒	✓	☒	✓
Sediment Basin	✓	✓	☒	✓	☒	✓
Skimmer Basin	✓	✓	☒	✓	☒	✓
Riser Basin	✓	✓	☒	✓	☒	✓
Stilling Basin/Pumped Effluent	✓	✓	✓	✓	✓	✓
Sediment Geotextile Bag	✓	✓	✓	✓	✓	✓
Rock Pipe Inlet Protection	✓	✓	✓	✓	✓	✓
Temporary Slope Drain	✓	✓	✓	✓	✓	✓
Rock Inlet Protection	✓	✓	✓	✓	✓	✓
Rock Check Dam	✓	✓	✓	✓	✓	✓
Temporary Earth Berm	✓	✓	✓	✓	✓	✓
Temporary Silt Fence	✓	✓	✓	✓	✓	✓
Filter Stone Fence	✓	✓	✓	✓	✓	✓
Filter Stone Silt Fence Breaks	✓	✓	✓	✓	✓	✓
Temporary Silt Ditch	✓	✓	☒	✓	☒	✓
Temporary Diversion	✓	✓	☒	✓	☒	✓
Wattle	✓	✓	✓	✓	✓	✓
Wattle Barrier	✓	✓	✓	✓	✓	✓
Wattle Silt Fence Breaks	✓	✓	✓	✓	✓	✓
Flocculants	✓	✓	✓	✓	✓	✓

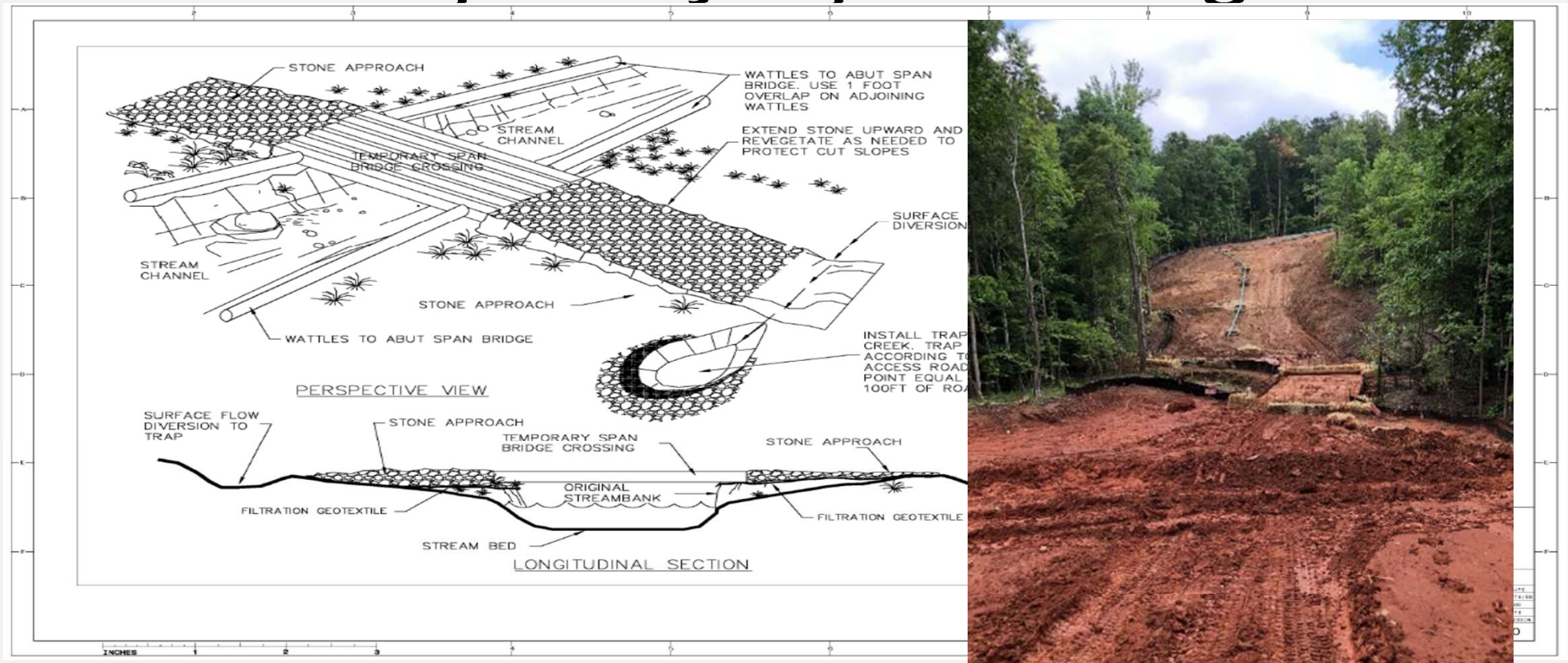
✓- BMP is allowed in this Permitted Area

☒ - BMP is **not** allowed in this Permitted Area

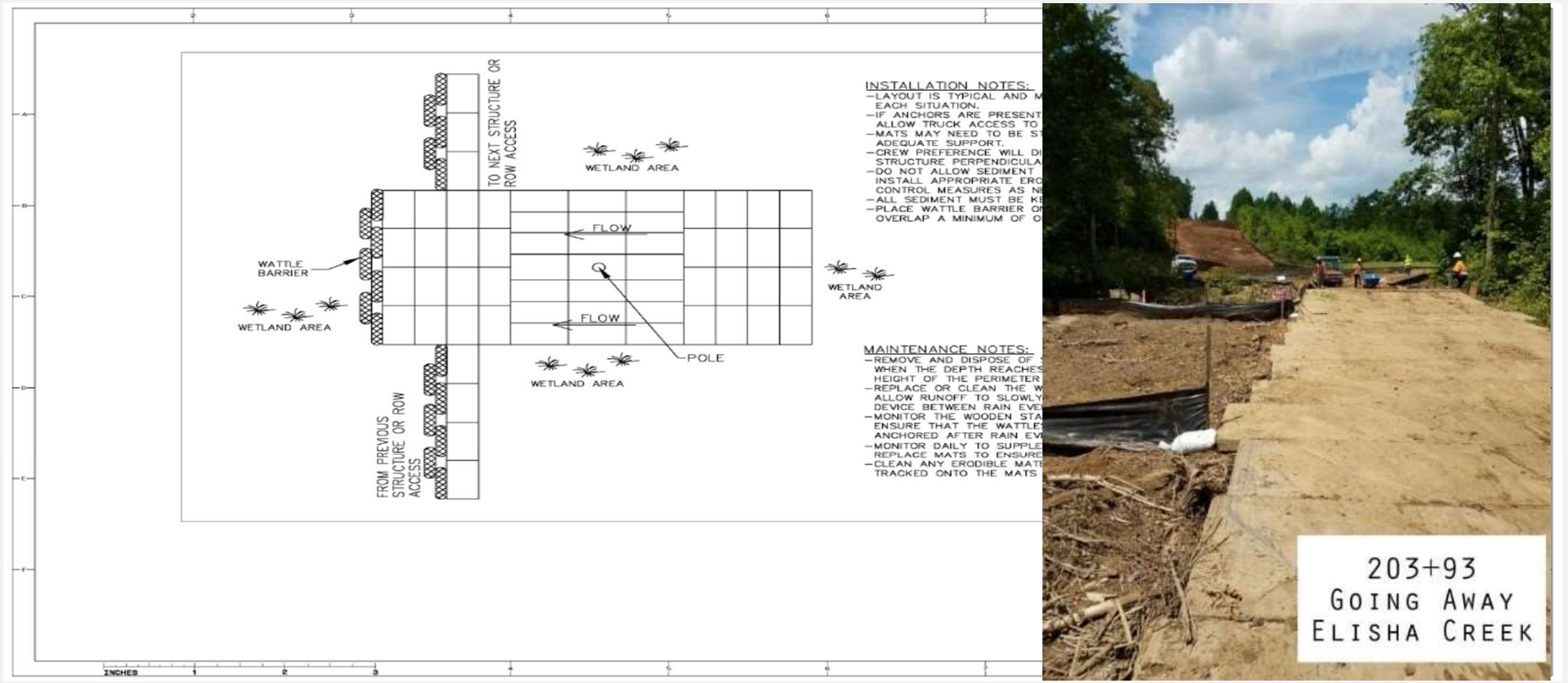
Wetland E&SC Design Tips

- Must be installed on ground surface
- No excavated BMPs
- Design sediment storage outside wetland boundary
- Easily removable upon project completion
- Rock allowed but completely removed

Temporary Span Bridge

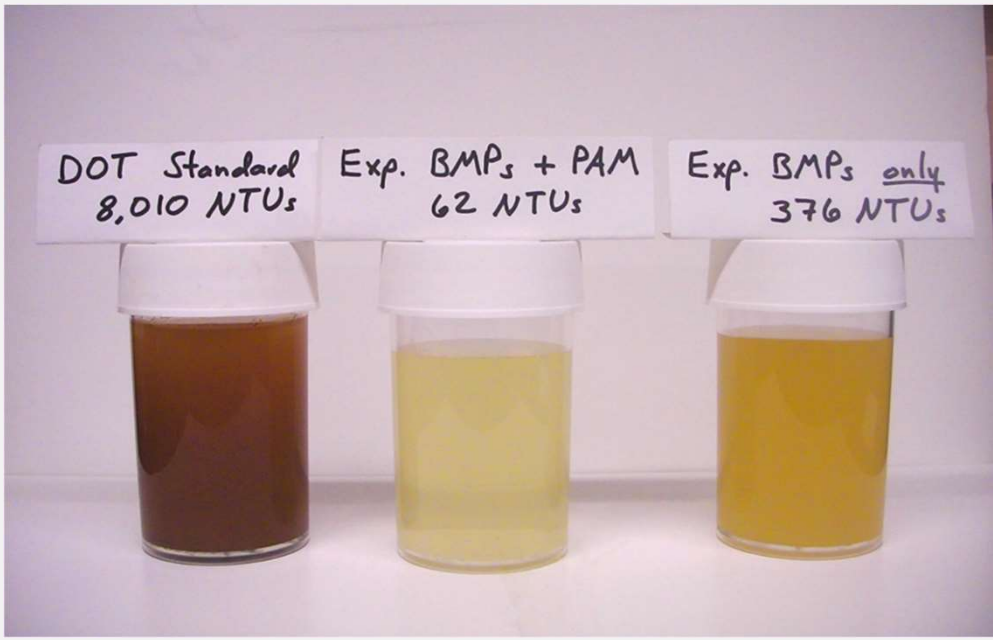


Work Zone Composite Matting



Other ESA related E&SC Design Tips

- High Quality Waters
  - Q25; one mile and draining to project
- Trout waters and T&E aquatic listed species
  - Q25; NC trout buffer waivers; use flocculants in the design
- 303(d) Impairment for Turbidity
  - Q25; one mile and draining to project



BMP Implementation and Maintenance Principles

- Divert clean water
- Slow down dirty water
- Treat it…
- Impound it…
- Settle it…
- Release it…
- Maintain it

Hay Bales

- Not recommended on linear utility jobs!
- Undermine, bypass, deteriorating strings ….
- Superior alternative tools available in BMP Toolbox

Slope Breaker/Water Bar/Diversion

- Excavated “or bermed” channel that directs runoff into a sediment control structure (NOT DIRECTED TO TSF)
- Used randomly throughout project to manage runoff across open grade
- Be aware of correct tracking techniques

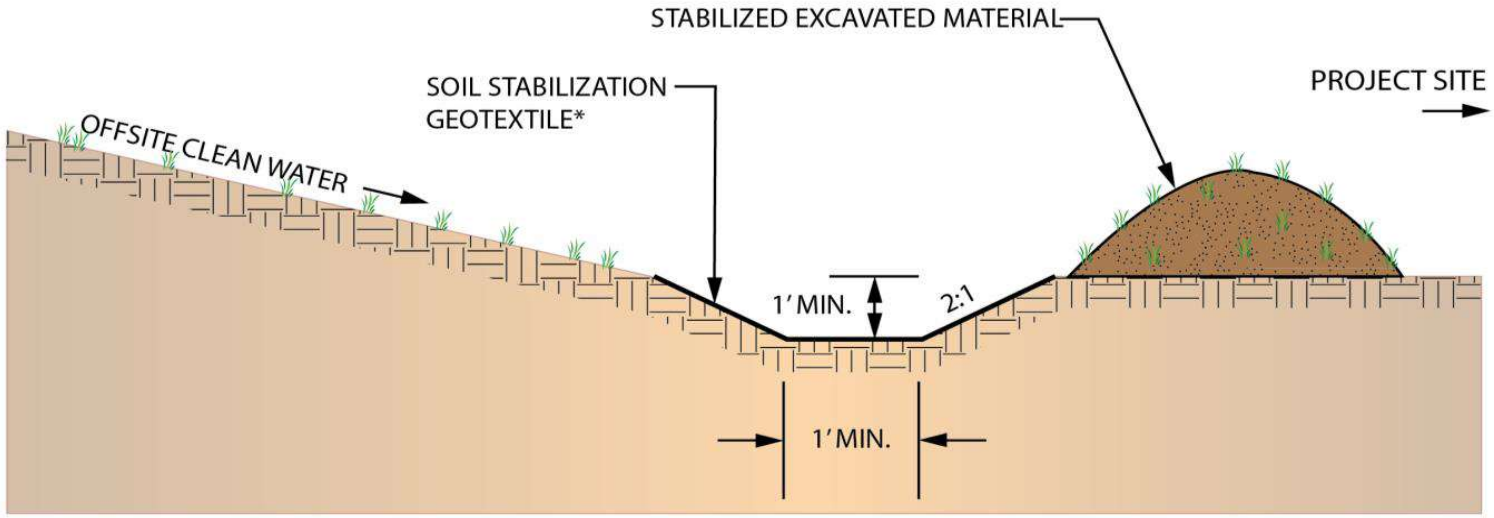
Clean Water Diversion

- Conveyance system that intercepts “clean” sheet flow up gradient of a project
- Transports clean “run on” water around the construction area and safely discharges

LINEAR UTILITY JOBS NEED CLEAN WATER DIVERSIONS

Clean Water Diversion

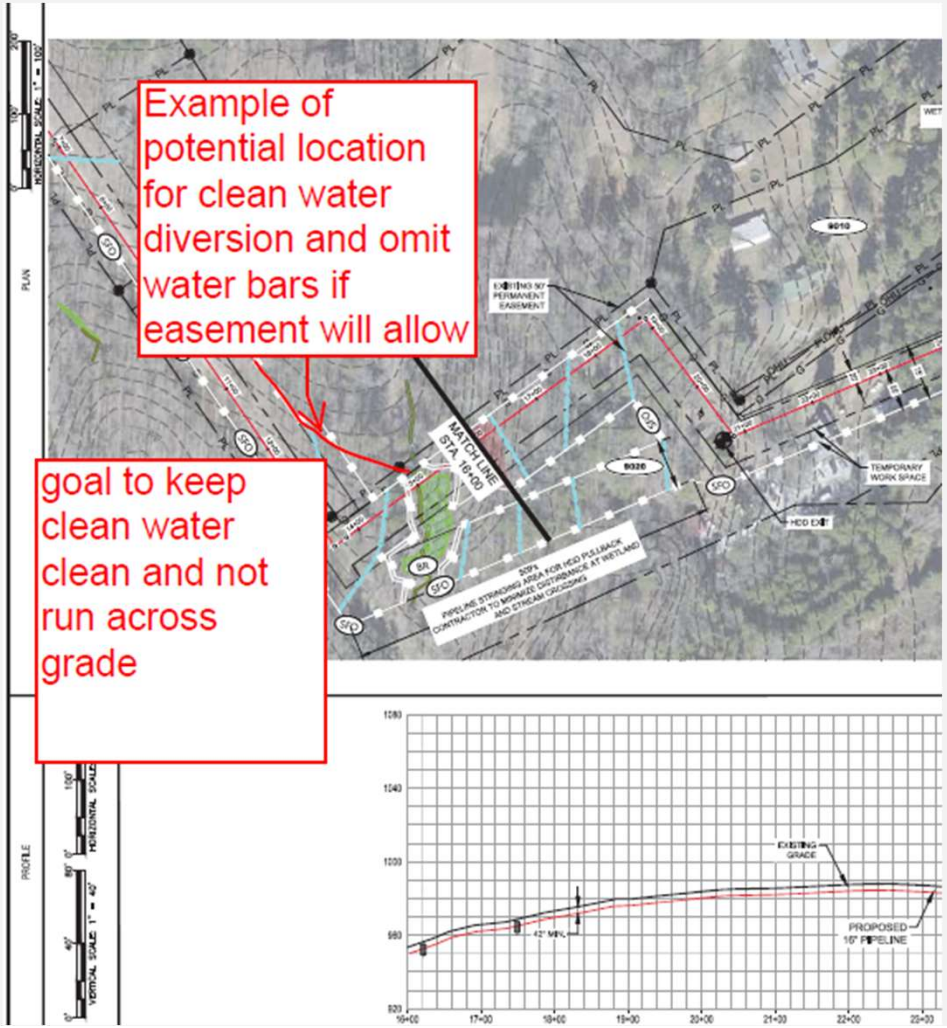
- May extend poly or fabric to top or over soil berm
- Alternative methods exist



CROSS SECTION (NOT TO SCALE)

** Geotextile fabric should extend up and over the inside face of the berm for projects with jurisdictional trout waters.*

Temporary Clean Water Diversion



Temporary Wattle Diversion

- Option for hard to access areas or in areas with rapid phase sequencing
- Pin down and “teepee” stake to obtain good soil contact

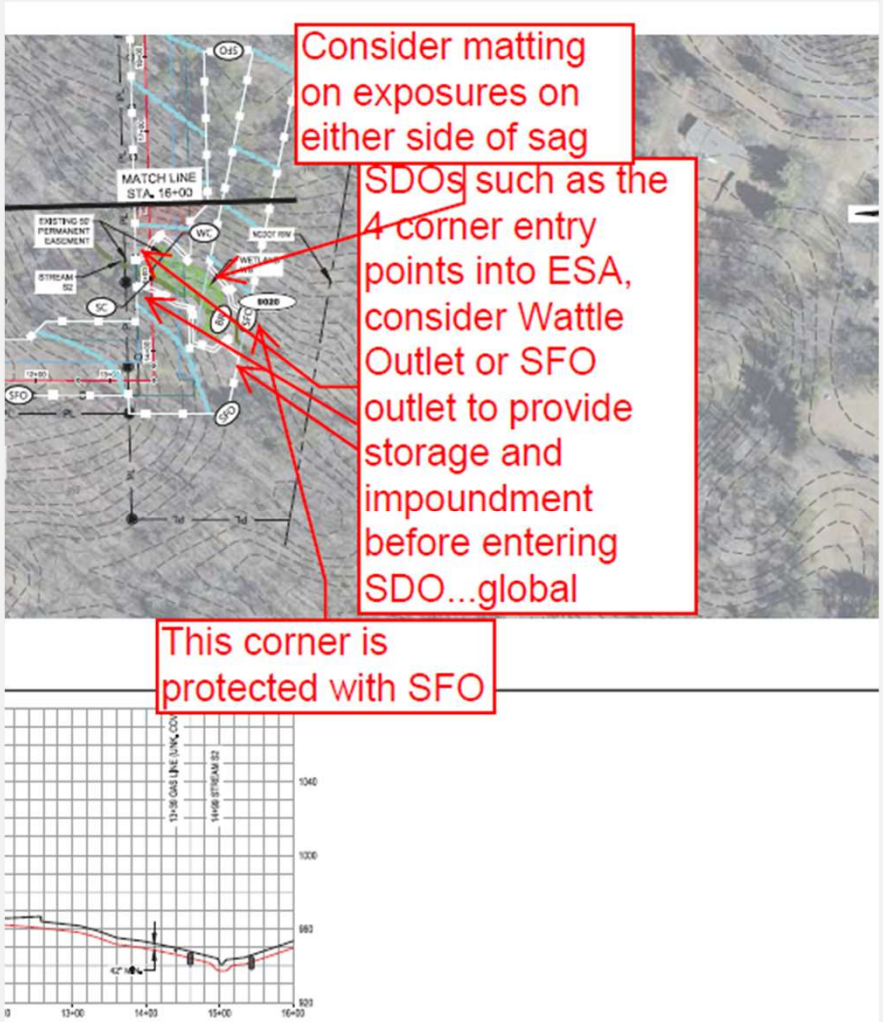
Sediment Containment BMPs

- Silt Basin/Trap
- Skimmer Basin
- Rock Sediment Dam
- Coir Fiber Baffle

Temporary Silt Fence

- Cannot construct job with silt fence as primary sediment control
- Slope length and slope steepness are major E&SC challenges for linear construction ops

Sediment Storage at ESAs



Silt Basin/Trap

- Suggest a BMP for this location
- Think back on our Imp&Mnt principles

Silt Basin/Trap

- Collects sediment
- Used on SFOs, water bars, locations to slow velocity, impound stormwater, and settle/store sediment
- Maintenance - regularly clean out sediment at ½ design capacity

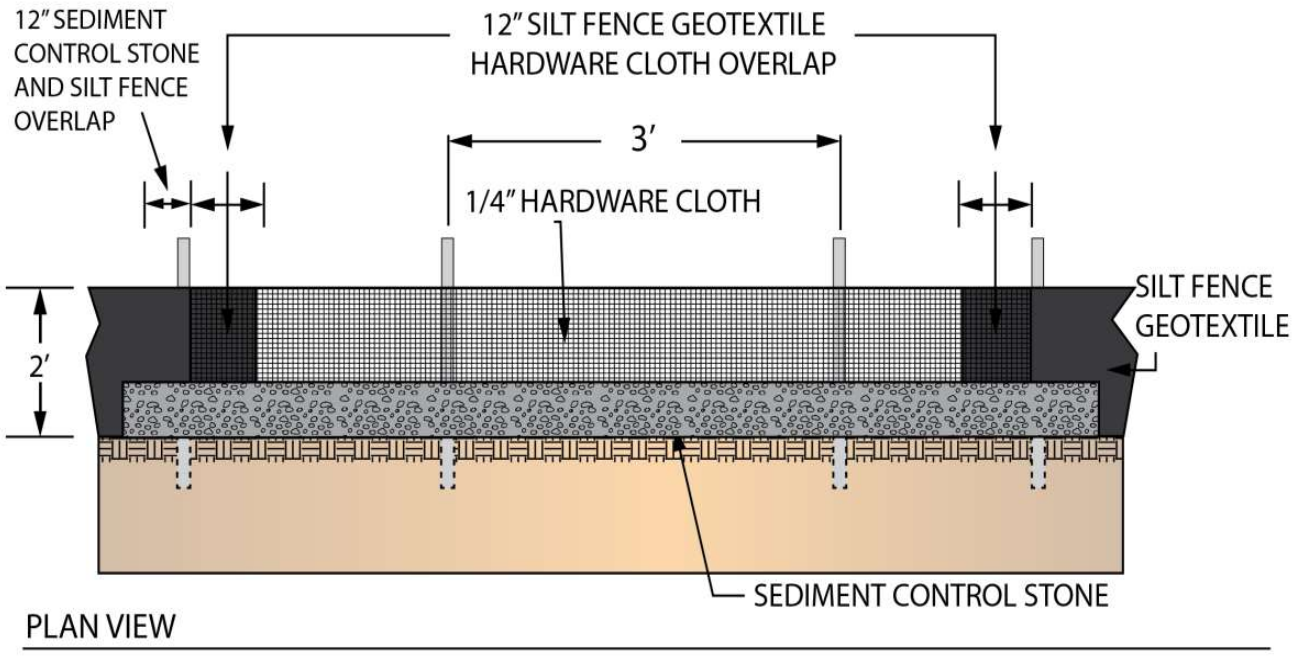


Silt Fence Outlets/Breaks

- Serves as a drainage break in long runs of silt fence to intercept runoff
- Provides additional sediment control in low/sag locations
- Hardware cloth w/stone or Wattles can be used in the break
- J-hooks

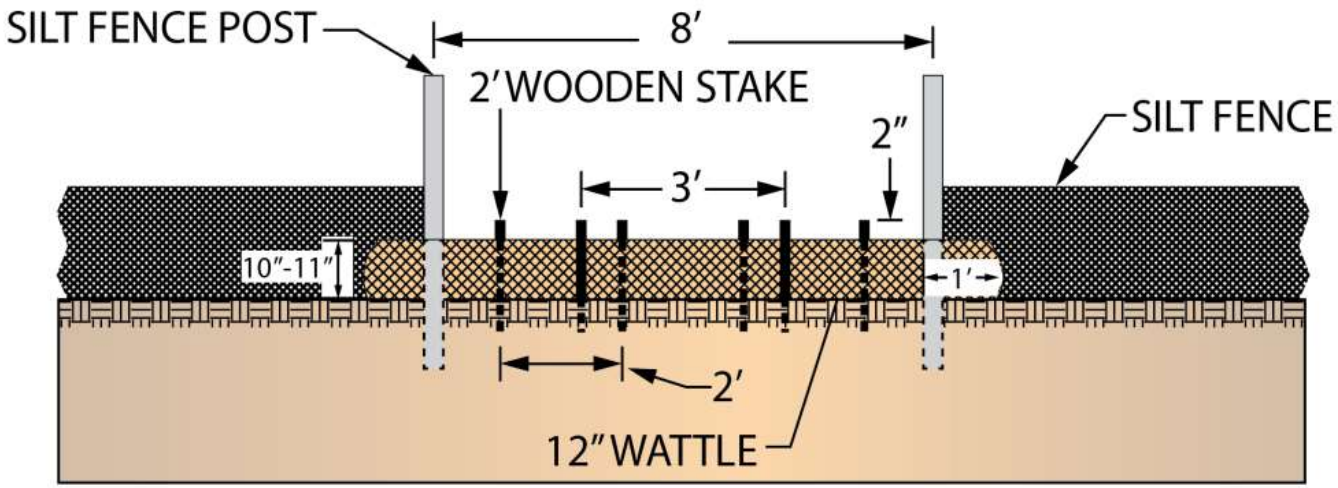
Silt Fence Break with Sediment Control Stone

- Secure overlap sections b/w silt fence and hardware cloth
- Uniform height on sediment control stone
- Install at low point or sag



Silt Fence Break with Wattle

- One foot overlap b/w wattle and silt fence
- Well installed wattles



FRONT VIEW

Silt Fence Outlets (SFO)/Breaks

- All linear utility jobs w/ SFO's need sediment storage (pit/basin) and baffles
- No construction related discharge should leave job w/out basins and baffles

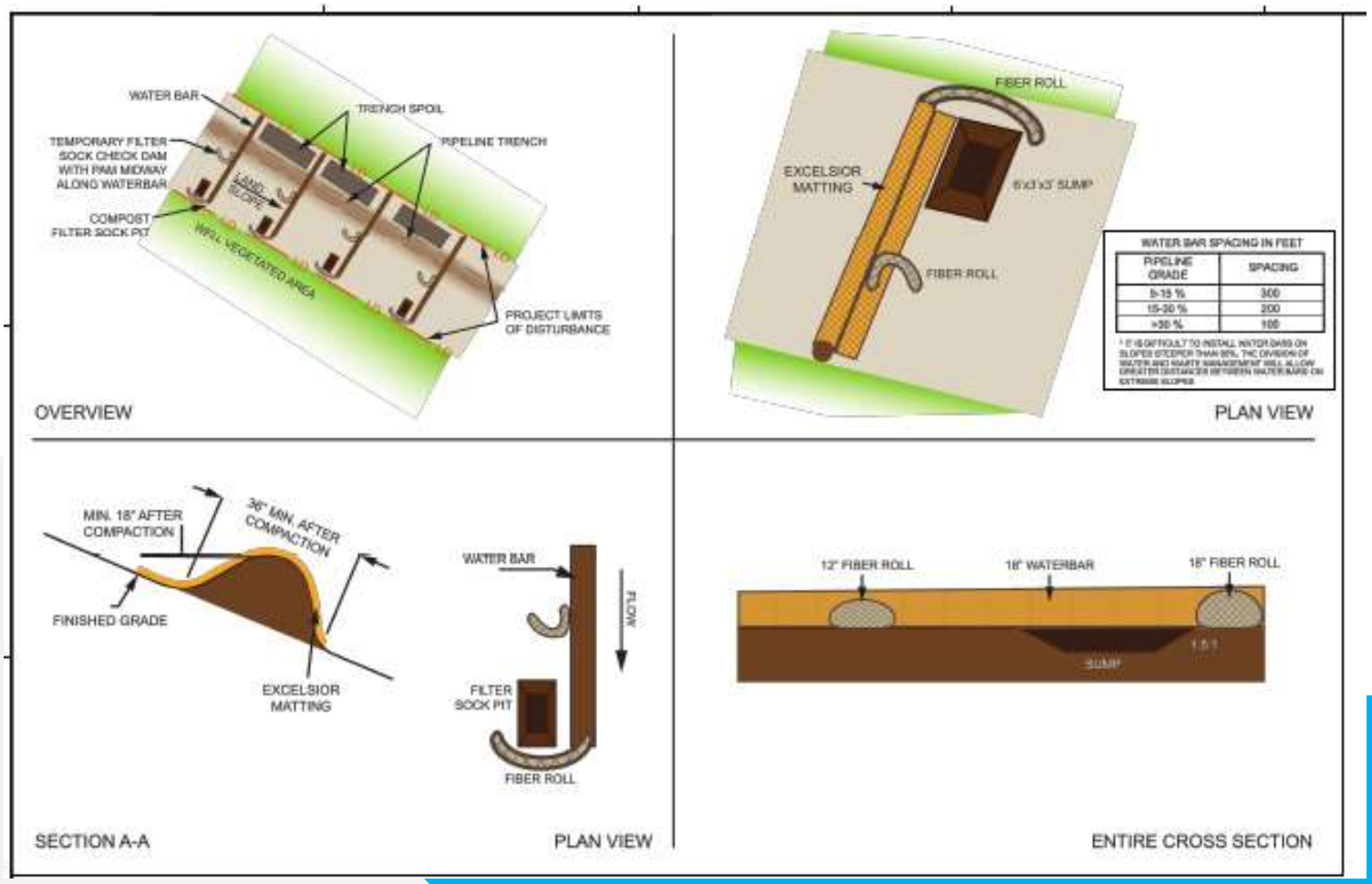
Silt Fence Outlets/Breaks

- More examples of basins w/baffles at outlet locations

Coir Fiber Baffle

- Used to spread flow out across basin and to reduce turbulence.
- Steel posts, 4’ spacing, 700 g/m2 coir matting, wire support, zip ties

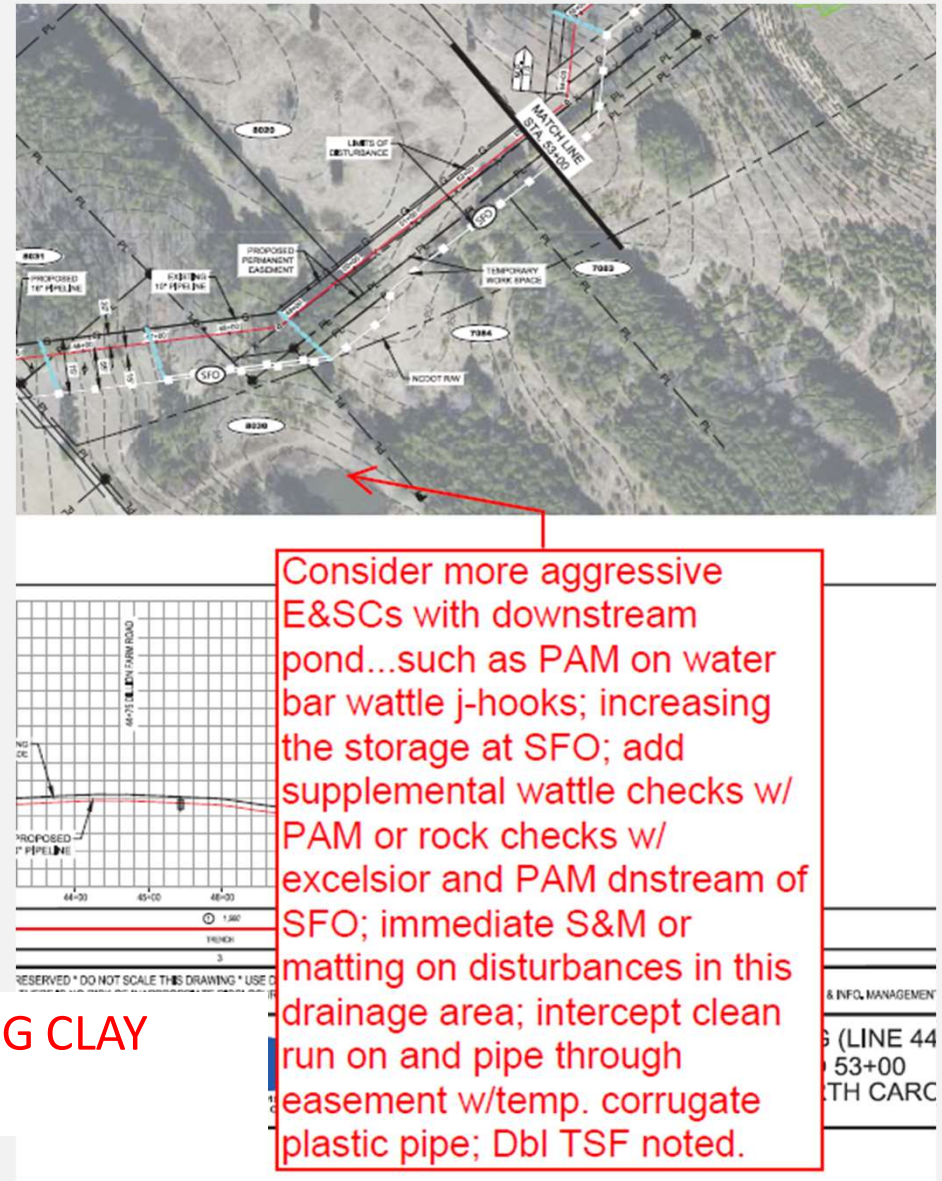
Implementing sediment storage w/effective outlet treatment



E&SC Strategies for Adjacent Farm Ponds

- PAM on water bar wattles
- Increase storage at SFOs
- Supplemental wattle cks with PAM
- Rock cks w/excelsior & PAM
- Intercept clean run on water
- Immediate Seeding and Mulching
- Matting on steeper slopes
- Additional easements for sediment storage
- Turbidity curtain at pond

Supplemental E&SC design tips for downstream Ponds

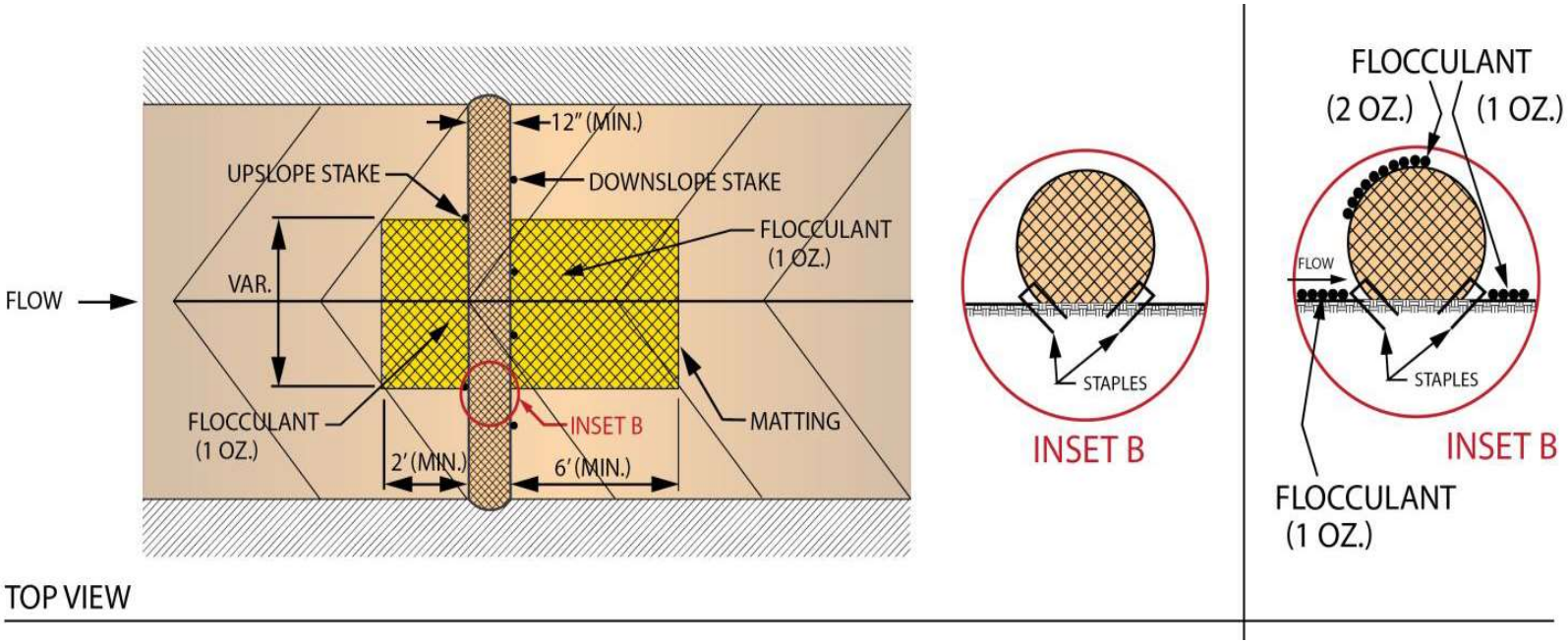


LINEAR UTILITY JOBS ENCOUNTERING CLAY
…..NEED FLOCCULANT (PAM)

Wattles Coir / Excelsior

- Function as an alternative to rock silt checks
- Effective delivery devices for polyacrylamide (PAM)
- Requires matting underneath and proper staking

Wattle


12" (MIN.)
UPSLOPE STAKE
DOWNSLOPE STAKE
FLOCCULANT
(1 OZ.)
VAR.
FLOW
FLOCCULANT
(1 OZ.)
INSET B
MATTING
2' (MIN.)
6' (MIN.)
TOP VIEW
STAPLES
INSET B
FLOCCULANT
(2 OZ.)
(1 OZ.)
FLOW
STAPLES
INSET B
FLOCCULANT
(1 OZ.)

Temporary Rock Check Dam with Matting & Flocculant

- Constructed of Class B rip-rap and #5 or #57 sediment control stone
- Uses excelsior matting to cover sediment control stone and serves as platform for flocculant application

Inadvertent Returns on Horizontal Directional Drilling (HDD)

- Provide perimeter protection around HDD bore pits and solids management systems

Inadvertent Returns (IR) on HDD Operations

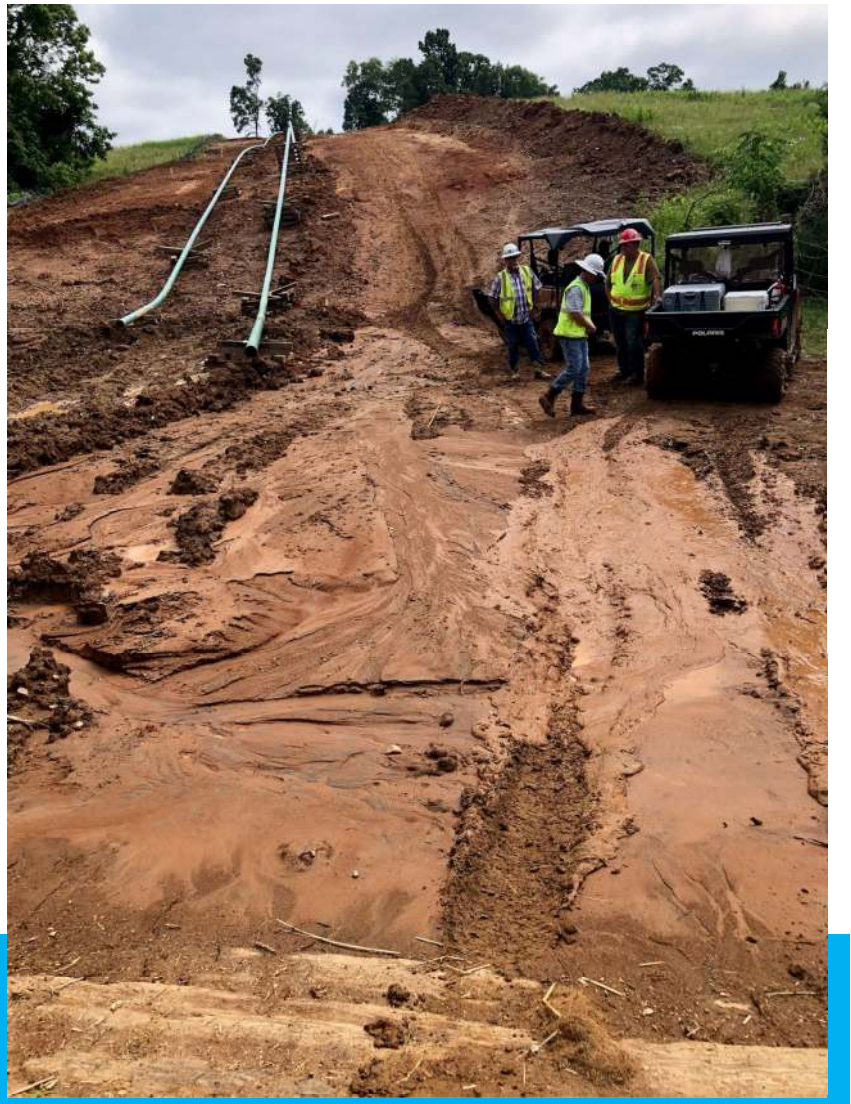
- Have a written IR plan to address containment, recovery, and restoration of drilling fluids

Final Stabilization/Revegetation with RECPs

Final Stabilization/Revegetation with HECPs

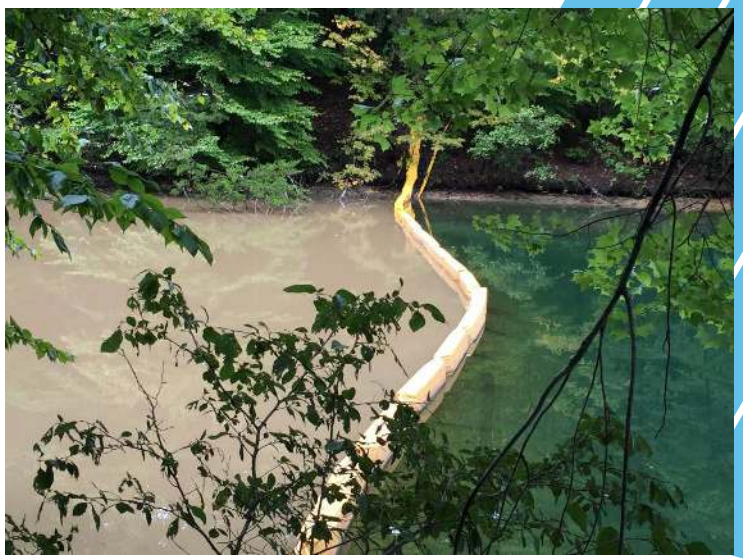
Pulling It All Together

- What are some supplemental BMPs for this linear utility location?



Summary

- Follow, implement, update E&SC plan
- Attention to detail!
- Manage runoff
- Flocculants (PAM)
- Basins/Traps/Sumps w/Baffles
- Clean water diversions
- Limit amount and duration of exposure
- What is my buffer b/w work zone & watercourse?
- Maintain E&SC measures
- Achieve rapid stand of ground cover



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