

Western North Carolina Erosion, Sediment, and Turbidity Control Training and  
Demonstration Site

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Western North Carolina has seen unprecedented growth in recent years, with large retirement and recreational communities being developed along with the commercial, medical, and other development which accompanies population growth. One of the major attractions of the area is the quality of the environment, including relatively pristine water and aquatic environments. This resource is threatened by pollution and excess runoff both during and after development.

Although the guidelines set by the Environmental Protection Agency (EPA) and state regulations require construction activities to minimize soil erosion and to install sediment controls, considerable amounts of sediment continue to be released at these sites. In one of the few published studies on this subject, Line and White (2001) estimated that typical sediment basins on actual construction sites retain only 50-60% of the sediment that they receive. This translated to a range of 4.4 to 23 metric tons year<sup>-1</sup> ha<sup>-1</sup> of sediment released from the sediment traps. North Carolina State University's (NCSU) research has indicated that retention rates may be as low as 30%, although improved designs can raise this rate to over 90% (McCaleb and McLaughlin, 2008). These improved designs are now largely required in North Carolina, although many installers still have no experience with proper installation and maintenance. We have also found that relatively simple, inexpensive systems can reduce the turbidity of construction site runoff by 99% (McLaughlin et al., 2009a, b). The US EPA has recently set an Effluent Limit Guideline for construction sites which will mandate the use of advanced Best Management Practices (BMPs) such as those we will be including in our trainings. Education is needed to train about the proper design, installation, and maintenance of these BMPs and other water quality improvement techniques.

We propose to initiate construction of an erosion, sediment, and turbidity control (ESTC) demonstration center at the NC State University Mountain Horticultural Crops and Extension Center in Mills River, just south of Asheville. This will be modeled after the highly successful Sediment and Erosion Control Research and Demonstration Facility developed a decade ago at the Lake Wheeler Road Field Laboratory in Raleigh. The

key elements to be included initially will be a water storage pond, a small sediment basin, and a ditch. This will provide an opportunity for workshop attendees to install skimmers and baffles in the basin and to install various BMPs in the ditch. With a source pond located above these, live “storm events” can be simulated to demonstrate the function of these devices. Other types of erosion, sediment, and turbidity control devices and systems can also be demonstrated in the same area. The Center has a classroom which can hold up to 100 people, making it ideal for the types of workshops we are planning.

### Design

The Center has an extensive irrigation system which will serve as the source of water for the demonstration area. The main features of the site will be a small sediment basin with two ditches leading to it. The basin will be 10' x 20' with 2:1 side slopes, a solid dam with a stabilized spillway, and a 3" pipe outlet to accommodate a skimmer device. A solid or flashboard riser will also be installed as an alternative outlet. The purpose of the basin will be to train people on the proper installation of baffles and skimmers and the demonstration of turbidity control methods.

Leading up to the basin will be two 60' ditches, one with a “V” design and one with a trapezoidal design. These will be install with a 3-5% slope, depending on the topography at the site. The ditches will be used for training in erosion control practices such as proper installation of erosion control blankets and a variety of check dams. They will also serve as demonstration site for passive treatment systems used to introduce flocculants into runoff in ditches.

Adjacent to the basin and ditches will be a naturally sloped area which can be periodically tilled to create a bare soil condition for the installation of a variety of erosion control blankets, hydromulch, and new ground cover materials. This will serve as both a training area, where participants do the installation, and for demonstration of new and alternative ground covers. A portable rainfall simulator (stationary nozzle) will be constructed for demonstrations of effectiveness of various ground covers and chemical stabilizers.

### Training

The focus of the facility will be to provide hands-on training for local contractors and others involved in land disturbance activities. Typically, this will involve 1-2 hours of classroom time in which the basic erosion and sediment control practices are reviewed, followed by time in the field when the participants actually install these practices. Included would be silt fence, check dams, erosion control blankets, straw (visual calibration to 1-2 tons per acre), porous baffles, and skimmers. Additional practices may be included as suggested by local officials or which are new and innovative.

Training will be arranged and coordinated with state and local program staff to ensure that the material covered matches deficiencies they have noted in the field. Staff will be invited to participate in all programs, and the training facility will be open for state and local erosion and sediment control programs to use. Training modules recently developed for Land Quality will be used extensively in these workshops.

Additional training will be offered on methods to achieve the new requirement for turbidity control that was issued by the US EPA. To achieve the 280 nephelometric turbidity unit (NTU) daily average in construction site runoff, a variety of passive chemical treatments will be required to be deployed. Training on the design, installation, and maintenance of these systems, largely developed at NC State University, will be offered several times per year as needed.

### Literature Cited

- McLaughlin, R. A., S. A. Hayes, D. L. Clinton, M. S. McCaleb, and G. D. Jennings. 2009a. Water quality improvements using modified sediment control systems on construction sites. *Trans. Am. Soc. Ag. Eng.* 52(6): 1859-1867.
- McLaughlin, R. A., S. E. King, and G. D. Jennings. 2009b. Improving construction site runoff with fiber check dams and polyacrylamide. *J. Soil and Water Cons.* 64(2):144-154.
- McCaleb, M. M., and R. A. McLaughlin. 2008. Sediment trapping by five different sediment detention devices on construction sites. *Transactions of the American Society of Agricultural and Biological Engineering* Vol. 51(5): 1613-1621

### Budget

#### Salary & Benefits

|   |          |
|---|----------|
| Extension Associate (1 mo.).....                                | \$6,000  |
| Supplies (rock, pipe, valves, liners, similar).....             | \$5,000  |
| Contract Grading (storage pond, basin, ditch).....              | \$5,000  |
| Travel (to/from site, overnight stays during construction)..... | \$1,000  |
| Total Direct .....  | \$17,000 |
| Indirect (15%).....   | \$2,550  |
| Total.....  | \$19,550 |