



ShearForce10 ECTRM Installed over cool season grass mix in high flow channel at the base of an overburden cap on September 10, 2019. Objective: Evaluate potential as rock riprap replacement in high flow areas at the mine



Mats were installed between rock checks using 8 inch sod staples and 6 inch fabric pins on 1.5 ft centers according to published InstaTurf installation guidelines. Note small sections of channel downstream and upstream of mats left unprotected for comparison.



Upslope terminal ends of mats were trenched in approximately 6 inches (left). Mat edges at top of both sideslopes (Right photo) and downstream terminal ends were simply stapled on 9 inch centers with loose soil placed over edges.



Completed ShearForce10 Installation looking down channel grade

Nearly One Month Later, ShearForce10 Waiting for Rain



Due to the lack of rainfall in September (.6 inch total), very little germination had occurred by Oct 7

Major Erosion Damage of Unprotected Areas Caused by Late October Storm Flows



...Just two weeks later, the rains came, with major storm events on Oct 21 (1.65 in) and Oct 26 (2.2 in) wreaking havoc on straw mulched slopes/channel bottom and riprap check dams as apparent in these photos taken Nov 20. Over 6.5 inches of rain fell in October, what a mess!

ShearForce10 Protected Section Locked Down Solid!



But wait, what's that green patch between those ugly rock piles? ShearForce10 had survived the multiple deluges with no significant erosion issues. Note new vegetation growth and sediment deposition on top of mats.



Upslope view of ShearForce10 just after installation on Sep 10 (left) and on Nov 20 (right).



New grass growing on channel bed (left) appeared to be in good condition in spite of being laid over by water flow. Grass on the left sideslope (right) was quite dense, especially compared to surrounding straw-mulched areas.



The staple anchor check at top edge of left sideslope effectively prevented rills in unprotected upslope area from undermining the ShearForce10.

The Consequences of Underestimating Flow Depth



But wait, there's more. Apparently we should've used more ShearForce10! The right sideslope (looking downstream) where no ShearForce10 was used was badly scoured by over 8 inches. Incredibly, the ShearForce10 prevented erosion of soils and vegetation directly under it. Never seen anything like this before!

Scour of Unprotected Downstream “Control” Section



The unprotected area downstream from the ShearForce10 and rock check exhibited severe scour.

Scour of Unprotected Downstream “Control” Section



The unprotected area downstream from the ShearForce10 exhibited severe scour over 18 inches deep!

Scour of Unprotected Upstream “Control” Section



The only mat “breach” observed was at the upstream terminal end. Scour from the upstream unprotected area encroached the 6 inch trench and flipped back the edge of one mat. Remarkably the ShearForce10 prevented undermining from progressing. Note: In retrospect, we should’ve installed mat up to and under the rock check dam.



As illustrated by the severe erosion and scour of adjacent unprotected soils , the ShearForce10 performed incredibly well at locking down soils, while growing and reinforcing natural grass under extreme conditions!