Control of Road Construction Excavation and Sidecast Material, BMP 15.10

Objectives

1) To reduce sedimentation from unconsolidated excavated material through the use of slash-filter windrows.

Site Description

This site is located on Foothills Road 5498 in the Ninemile drainage. It is on the Ninemile Ranger District, of Lolo National Forest, in Section 24, Township 17N, Range 24W. LSI Classification is 15JB.

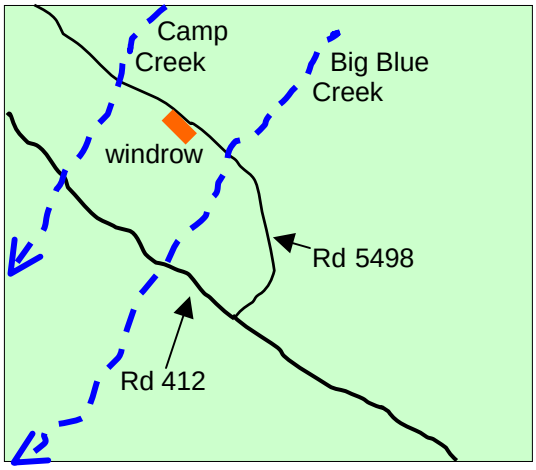

Figure 1

Narrative

Approximately 4 miles of the Foothills Road 5498 was reconstructed after the Upper Ninemile Fire Complex of 2000. To prevent sidecast construction material from entering Camp Creek or Big Blue Creek, a slash-filter windrow was installed.

Slash-filter windrows are built at the toe of a fill as an obstruction to minimize the movement of sediment from the fill (Burroughs and King, 1989; Cook and King, 1983; King, 1979; Teenyson and others, 1981). The windrow reduces sedimentation by filtering and dissipating energy.

The fillslope between the windrow and road was seeded and mulched with weed-free straw (photo 1). The seeded area will provide an extra buffer once vegetation has established. Below the windrow is a 48-inch culvert. The inlet and outlet of the culvert are armored with rock and mulched with straw.

Photo 1

Observations and Measurements

The windrow is 100 yards long (photo 2). The average diameter of the slash ranges from 1 to 4 inches, consisting mostly of western larch and Douglas fir branches. The 9-foot slope between the slash-filter windrow and the road surface is thoroughly seeded and mulched.

An adequate amount of slash was used in the construction of the windrow (photo 3). Erosion has not occurred on this site.

Photo 2

Photo 3

The difference between the amount of sediment produced between windrowed and non-windrowed fillslopes is dramatic. In a study done by Cook and King in 1991, eroded material was collected in troughs for three years after road construction, below both windrowed and non-windrowed fillslopes. For slopes 10 feet or less, erosion volume on the windrowed slope was 0.325 $feet^3$/100-feet of road. On the non-windrowed fillslopes, erosion volume was measured to be 35.85 $feet^3$/100-feet of road, an increase of more than 100 times.

Effectiveness

This practice has proven to be effective. Sedimentation from unconsolidated excavated or sidecast material has been minimized by a slash-filter windrow. Road sediment has not deposited beyond the windrow. In addition trace amounts of sediment, found past the windrow, were more than likely produced by the installation of the new culvert. The windrow should remain effective for three to seven years or more (Cook and King, 1983, Burroughs and King, 1985).

Controlling In-Channel Excavation, BMP 15.13

Objectives

1) To disturb stream channels as little as possible, so little sediment is produced.
2) To comply with the FG-124 process per the Montana Streambank Preservation Act.

Site Description

This site is on Camp Creek downstream from its crossing on Foothills Road 5498 in the Ninemile drainage. It is located on the Ninemile Ranger District, of the Lolo NF, in Section24, Township 17N, Range 23W. LSI classification is 10UA.

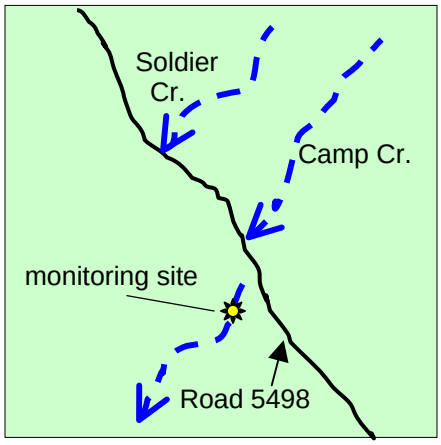

Figure 1

Narrative

The Lolo NF BMP handbook states, "equipment may cross, operate in or near a stream course only where it is designated by the Forest Service as necessary in the construction or removal of culverts and bridges, in compliance with the specifications and mitigation required in the FG-124 permit and included in the project specifications."

On Camp Creek, a small excavator was permitted next to the creek to remove an old log bridge (photo 1).

Photo 1

The excavator, used to remove the bridge abutment at Camp Creek, had a track approximately 10 feet wide. For the removal, only one abutment was eradicated. The excavator worked from one side of the stream. Disturbed areas of the stream banks and areas where the excavator tracked were seeded and mulched with straw following the removal. Willow and red-osier dogwood slips were planted along the stream banks (photo 2).

Photo 2

Observations and Measurements

The streambed was not damaged during the removal. Minimal pieces bark and wood splinters remained from the abutments, and could be washed downstream during high runoff (photo 3).

Photo 3

Minimal sediment displacement was observed when the abutment was removed (Photo 3). The excavator was on site for less than one day, and did not cross the stream. The surface area disturbed was minimal due to the use of a smaller excavator.

Effectiveness

The practice has proven to be effective. Stream channel disturbance and sedimentation were kept to a minimum. Project urgency necessitated a request for an FG-124 permit waiver. The Montana Fish Wildlife and Parks were consulted for criteria and guidance. The banks have been restored to their natural shape. Disturbed soils have been seeded, mulched, and planted with dogwood and willow slips. Within the year, vegetation should establish and act as a sediment filter. After one year, grass had grown on the disturbed area and a majority of the shrub slips had sprouted.

Diversion of Flows Around Construction Sites, BMP 15.14

Objectives

1) To minimize downstream sedimentation by insuring that stream diversions are carefully planned and executed.

Site Description

The construction site is located on the closed Road 17384, at the Siegel Creek crossing. Road 17384 is connected to Road 412 and is on the Plains Ranger District, of the Lolo NF in Section 35, Township 18N, Range 25W. LSI classification is 10UC.

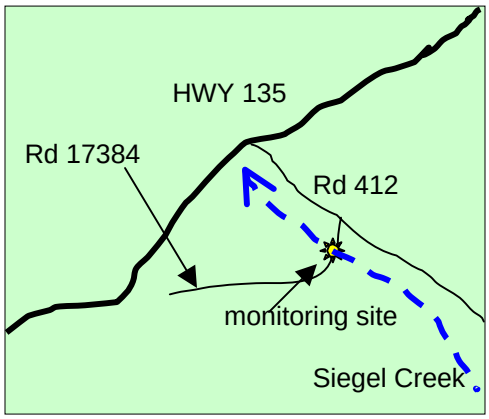

Figure 1

Narrative

Undersized culverts are at risk of failure from being blocked by debris and/or being overtopped. In addition, culverts that are fish barriers have a vertical drop, high velocity or are too shallow for fish to pass through.

The monitoring site culvert was considered too small and had a 2.8-foot drop at the outlet, preventing fish from migrating upstream. In 1979, Siegel Creek averaged 12 feet wide when bank-full. The culvert forced the stream to be necked down to 8 feet, thereby increasing water velocity passing through the culvert. By 1998, the increased velocities had scoured the streambed to a depth of 6 feet below the bottom of the culvert. In addition it widened the channel to 15 feet at the outlet (photo 1).

The culvert on Road 17384 was removed in stages. First, straw-bale sediment buffers were placed. Then brush and fill were removed from the site, and a clean-water diversion was installed. Next, the culvert was removed. Lastly, the stream channel was reshaped and stabilized.

Photo 1

At low flow, the stream was diverted through a by-pass culvert to keep fill and debris from washing into the stream (photo 2). After the culvert was removed, the channel was reshaped and contoured back to the natural grade (photo 3). Step-pools were created to match upstream and downstream grades, and to provide fish habitat. Streambanks were seeded, mulched with straw, and covered with slash to protect the bare soil.


Photo 2

Automated samplers were used to monitor sediment concentrations during removal. A control sampler was placed above the culvert, and another 150 feet downstream. Sediment concentrations before removal ranged from 0.8- to 3.0-mg/l at the control site, and from 1- to 2-mg/l downstream. During the removal process, the average amount of sediment produced was 0.04 tons/day, with a peak load of .30 tons/day.


Photo 3

Observations and Measurements

This site was monitored one year after the restoration project. The area showed no signs of bank instability, down cutting, head-cutting, or excessive channel adjustment. The grass was reestablishing. The stretch of bank that was once the alternate stream route, is now covered with grass and slash, and conforms to the natural bank. Diverting the original channel greatly reduced the amount of sediment delivered to the stream. Sediment concentrations increased for a short period, but decreased to pre-removal levels in 24 hours. About 500 cubic yards of fill were excavated to remove the culvert. Water monitoring demonstrated that less than 2 cubic yards of fill were lost in removal. Areas impacted by construction were restored to natural grade, condition and alignment (photo 4).


Photo 4

Effectiveness

This BMP has proven successful. Careful planning and execution minimized the amount of downstream sedimentation. The stream remained stable after high runoff, producing less sediment, and no longer constitutes a fish barrier. The site will be monitored yearly to document recovery trends and assess channel adjustments.

Stream Crossings on Temporary Roads, BMP 15.15

Objectives

1) To keep temporary roads from unduly damaging streams, disturbing channels, or obstructing fish passage.

Site Description

This site is located in the LaValle Creek Drainage, approximately ¼ mile from the beginning of the obliterated road section of Road 19205. The LaValle Creek Drainage is on the Missoula Ranger District, of the Lolo NF, in Section 5, Township 19 Range 19 (figure 1). LSI soil classification is 64QB.

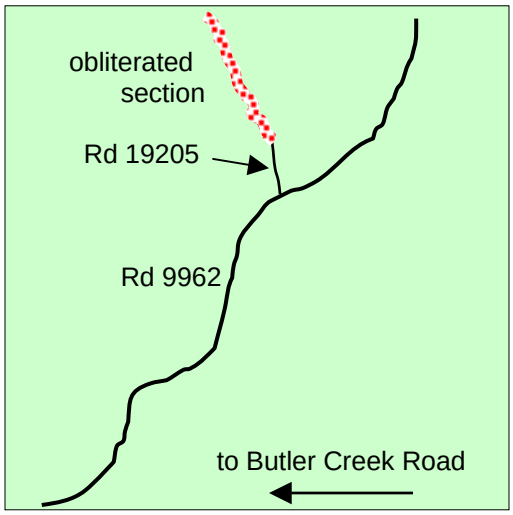

Figure 1

Narrative

A temporary bridge was installed as a crossing structure at LaValle Creek for a short-term road, 19205. A silt fence constructed on each side of the stream during installation prevented disturbed soil from entering the stream (photos 1 & 2).

Several steps were taken to construct and then remove the temporary bridge. First, timber beams were laid across the stream in order for the excavator to cross without damaging the channel. Then, concrete abutments were poured on both sides of the stream for support. Next, the temporary bridge was set in place (photos 3). After use, the bridge was removed in the reverse order. The impacted area was then seeded and covered with slash. Finally, road approaches on both sides of the stream were re-contoured.

Observations and Measurements

The silt fence constructed was 2½ feet tall by 40 feet long on the west side of the stream, and 70 feet long on the east side. Slash was laid on both sides of the stream banks and averaged 3 to 5 inches thick on the west side, and 1 to 3 inches on the east side. The stream showed no signs of impact.

Photo 1


Photo 2


Photo 3

Sedimentation was not visible at the site. Vegetation is reestablishing. Overall, the channel was closely restored to pre-project conditions (photo 4).

Effectiveness

The temporary bridge effectively met the desired objectives. The stream was protected from damage. Keeping machinery out of the stream limited disturbances. Fish were able to pass under the bridge and the natural stream flow was not constricted. After the bridge was removed, the road was successfully obliterated, seeded and covered with slash (photo 5).

Recommendations

Smaller debris may need to be added to the slash filter windrow. Treetops and branches could be utilized in the slash-filter windrows on both sides of the stream. Using a combination of smaller and larger slash in the windrow, compacted tightly together, would increase the effectiveness of the filter and provide additional bank protection. Planting willows or dogwood slips on the stream banks would also increase stability.

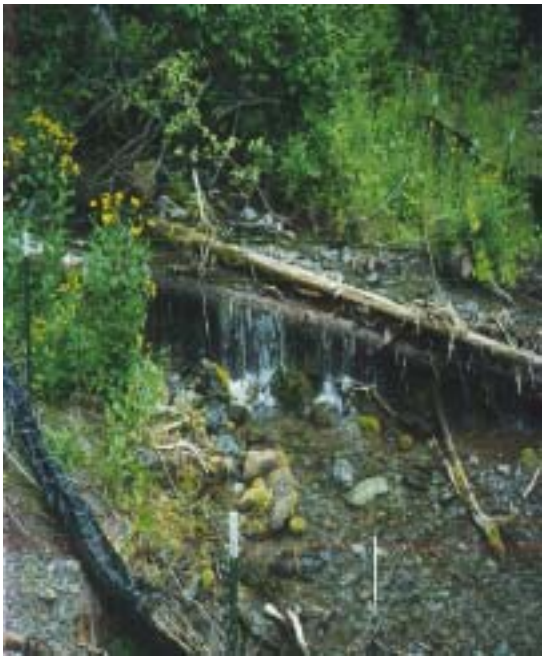
Photo 4

Photo 5