



improve the durability of the structures, it is advisable to dissipate energy gradually rather than as a concentrated drop. For this application, Newbury style grade control structures offer compelling advantages over concrete or sheet pile drop structures. These rock structures, illustrated on **Figure 3.6.1**, provide artificial riffles along the streambed. In addition to distributing energy, these rock structures improve water quality by increasing dissolved oxygen and providing refuge for benthic organisms.

While these structures are robust and simple to install, their suitability is limited to cohesive soils. This is an appropriate technique for the clayey soils in the basin. It is not appropriate for the sandy soils.

Sugar Creek continues to use local materials to stabilize its own grade and move to a more stable equilibrium condition. The frequent log jams are holding the grade at knick points. Extensive engineering evaluations of the stabilizing effect of large woody debris have been conducted at the National Sedimentation Laboratory in Mississippi and elsewhere throughout the US. Use of these structures should also be considered in Sugar Creek.

Water Quality

The second major issue influencing this stream is the poor water quality. Trash, sewage and sediment all compromise the quality of Sugar Creek. The generation of excess sediment can be managed by controlling incision as described above. During the field work, the team noted that nearly every manhole along the stream was leaking and the distinctive odor of raw sewage was pervasive. Patches of brownish foam were common near sewer pipes.

The trash sources include roadside ditches and direct dumping into the stream. The trash load in this stream is exceptionally high, and includes used diapers, kitchen garbage, bedding, furniture, electrical wires and scrap metal. In some reaches it was not possible to assess the bed material due to the thickness of the garbage layer.

Streams are a natural attractor for children and play structures occur along the stream edge. The pollution in this stream poses a serious risk of disease and injury and children should be strongly discouraged from playing in the stream until the trash and sewage are eliminated.

The leaking manholes and sewer pipes should be repaired immediately and protected from future damage. The garbage should be removed from the creek and an education and enforcement program to prevent further pollution should be implemented.