2.2.3 Highway-related Construction, Operation and Maintenance Activities

Highway-related construction, operation, and maintenance activities have taken place since the development of U.S. 6 and U.S. 40 in the early 1900's and continued with the development of I-70 beginning in the 1960's.

The construction of I-70 and other roadways have occasionally bisected mine adits (e.g., the Big Five Mine adit in west Idaho Springs) and cut through potential ore bearing rock formations. Other influences include the use of mill tailings as road base and the channelization of Clear Creek to accommodate the alignment of the roadways.

The installation of highway culverts and impervious surfaces has affected the natural regime of surface water and groundwater flow and valuable habitat. This influence leads to the dewatering of wetland areas by creating accelerated drainage of the wetland or may lead to the creation of wetland areas/pond areas by impounding waters that would normally be conveyed by a perennial or intermittent stream channel. Habitat required for the migration and propagation of aquatic dependent species (e.g., boreal toad) has been fragmented in some locations of the corridor.

In Colorado, the transport of hazardous material over state highways is regulated under the Colorado Hazardous Materials Act of 1987 (S.B. 156). This regulation directs the Chief of the Colorado State Patrol to designate which public roads shall be used by motor vehicles transporting hazardous materials in the state. The term hazardous material is applied to a wide range of substances. The types of substances found in the federal regulations (Resource Conservation Recovery Act), are explosive, gases, poisons, acids, fuels, and radioactive substances, along with household items such as paint and cleaning fluids. The Colorado State Patrol has designated I-70 as a hazardous material route. The transport of these materials poses a risk to nearby waterbodies and communities when accidents or incidents result in hazardous material spills.

Roadway deicers are used for de-icing and anti-icing during winter maintenance operations by CDOT. The type and amount of deicers used on state highways in Colorado varies according to location and elevation. The use of roadway deicers is considerably less at elevations below 9,000 feet since the snowfall is less at lower elevations. A combination of salt (sodium chloride)/sand mixture is typically used as well as various chemical deicers. County and municipal (e.g., Georgetown, Idaho Springs, etc.) also apply salt/sand to increase roadway traction on roadways under their jurisdiction.

De-icing and anti-icing practices improve roadway safety and mobility. From an environmental standpoint, there is considerable debate over the potential impacts deicers may have on nearby waterbodies, aquatic communities and vegetation. CDOT has completed two studies on the potential effects of magnesium chloride on water quality at higher elevations and is currently conducting further studies of chemical deicers to obtain information about their constituents and assess their advantages and disadvantages.

Additionally, the application of traction sand to roadways has influenced the streams and air quality of the corridor. Traction sand will be conveyed to streams during snowmelt runoff and precipitation events. The sediment generated from the traction sand tends to affect the substrate of streams and wetlands. The grinding of traction sand by continuous traffic reduces the grain size and increases the potential for suspension in the air as vehicles and wind pass over the highway surface.

Roadway runoff is highly variable and can be influenced by traffic volume, climate, maintenance practices, urbanization, vegetation and soil types, as well as institutional characteristics such as litter laws, and automobile emissions. Although not analyzed or quantified, constituents of roadway runoff include sediment, vehicular residue (rubber, oil, grease, metals, active chemicals, etc.).

Elements contributing to this issue include:

- Original Construction of U.S. 6, U.S. 40, and I-70
- Tunnel Operations
- Roadway Maintenance Operations
- Winter Maintenance Operations
- Slope erosion/highway cuts
- Hazardous Materials Spills
- Maintenance Yards
- Culvert Installation/Impervious Surfaces

2.2.4 Sedimentation

Sedimentation, a natural process, is the transport of soil particles resulting from eroding land and the subsequent deposition of these particles on stream and lake substrate. Sediment consists of particles of all sizes, including fine clay, silt, sand and gravel. Although sedimentation is a natural process, changes in sediment load and particle size within a stream system can have negative impacts on water quality, wetlands, stream habitat, recreational activities and other stream processes. Sediment tends to settle in the interstitial spaces of stream substrate, reducing or eliminating habitat for fish spawning and fish food organisms (benthic invertebrates). Sedimentation can negatively affect fisheries by reducing habitat (pool depth). Nutrients and metals can be associated with sediments having water quality impacts. Elements contributing to this issue include:

- Natural Sources (natural erosion)
- Land Use Sources
- Highway Sources
- Mining Sources

2.2.5 Channelization/Downcutting

Channelization, for the purposes of this document, is considered any unnatural alteration to the "historic" stream channel. Channelization typically results from a need to accommodate roadway alignments, urban development, and or flood control. Channelization has generally resulted in the reduction of channel sinuosity, loss of floodplain area and associated wetland and aquatic habitat as a result of increasing the channel depth or building up streambanks to contain flows. In addition to impacts to aquatic habitat, modifications to the natural stream channel can result in streambank instability, channel aggradation or degradation, changes in depth of groundwater, alterations in floodplain, increased stream turbidity, increased stream velocity, and other impairments to the stream ecosystem. Channelization will typically reduce the area and extent of natural floodplains by accelerating the conveyance of water (increasing the stream slope and velocity). Reduction in floodplain area and extent will result in reduced groundwater recharge potential adjacent to the stream and riparian habitat.

The construction of U.S. 6, U.S. 40, and I-70 channelized segments of Clear Creek, resulting in the reduction of natural meandering or sinuosity. However, sinuosity can be limited by factors other than highway construction practices (e.g., bedrock formation, gradient, substrate particle size). The SS sinuosity has been estimated to provide an indication of the extent of reduced meandering. A sinuosity of "1" indicates a straight stream with no meandering.

Channelization often results in downcutting of the stream or drainage. Downcutting is described as the degradation of a natural stream channel resulting from downward stream energy caused by an increase in the slope of the stream. Downcutting can be caused by a variety of factors including urbanization, roads, utility crossings, dams, and clearing of vegetative cover. Elements contributing to this issue include:

- Highway Development
- Adjacent Land Use Practices (urbanization)
- Historic Mining Practices

2.2.6 Habitat Reduction and Fragmentation

Highway, urban, and recreation developments within the Clear Creek drainage system have encroached upon wetlands/riparian areas and areas that previously provided valuable functions for various aquatic species. Riparian areas promote species richness, stream shading (maintain low water temperatures), and provide food sources for aquatic organisms. The organic nature of the wetland soils also tends to bind dissolved metals in the surface waters reducing the bioavailability of the metals and their toxicity to aquatic organism. In addition to the encroachment, development may have created barriers for movement of aquatic species and fragmented valuable habitat (e.g., boreal toad habitat). The actual extent of wetlands existing prior to construction of I-70 can only be reasonably estimated at this time. Wetlands encroached or eliminated during the

construction of I-70 and other developments were estimated from wetland maps, aerial photography, and ground truthing. These estimates were based on interpolation and best professional judgment. Elements contributing to the loss or modification of wetlands include:

- Highway Development
- Adjacent Land Use Practices (urbanization)
- Recreational Resource Development

2.2.7 Water-based Recreation

Clear Creek provides numerous opportunities for water-based recreation. The extensive channelization downstream from the West Fork of Clear Creek to Floyd Hill has created attractive white water rafting and kayaking opportunities. Commercial rafting on Clear Creek was first documented in 1989 with 600 user-days. Since 1989, rafting has steadily increased in popularity with nearly 14,000 user-days in 2000 (CROA, 2000). The highly productive fisheries downstream from the West Fork of Clear Creek to Idaho Springs have also provided desirable angling opportunities. Georgetown Lake offers a multitude of recreational opportunities including fishing (shoreline and ice), ice sailboating, and on-ice "Jeep" racing. Elements contributing to this issue include:

- Fishing
- Rafting/Kayaking
- Ice Racing