

## Site 19 – Hood Creek

The Hood Creek crossing is located approximately 3.3 km north of the junction between Highway 40 and Highway 742. A debris flow hazard was identified at this crossing during the initial site inspection in July 2005. Key observations from the site inspections in July and August 2005 are as follows:

- It is understood that shortly before the July 2005 inspection, the highway maintenance contractor had excavated a large volume of debris that was blocking the culvert inlet. It is not known if the debris was deposited during a single event or had built up over multiple years. As shown in Photos 1 and 2, the channel walls around the basin just upstream of the culvert inlet showed a “high water” mark indicating that the maximum thickness of debris that was removed was in the order of 5 to 6 m and tapered back to around 1 to 2 m at a distance of approximately 80 m upstream of the highway.
- As shown in Photos 2 and 3, the inlet and outlet of the culvert were roughly 50% (or more) filled with rock debris at the time of the site inspection. The culvert was fully blocked with debris a few metres in from either end. There was a low volume of flow along the creek at the time of the inspection and it was percolating through the debris in the culvert.
- The creek channel upstream of the highway flows through a narrow bedrock canyon, as shown in Photos 4 and 5. The downstream end of the canyon is located roughly 200 m upstream of the highway and it appears on the airphotos that the upstream end of the canyon is around 1000 m upstream of the highway. The segment of the channel within the canyon has “high water” marks indicating significant flow volumes and debris flowing down the channel earlier in 2005 (see Photo 5).

The airphotos of this site show that the highway crosses the Hood Creek channel around the apex of a large fan of debris deposited across the lower portion of the channel. The debris fan is similar in form to many other creek channels that Highway 40 crosses in this area however it is significantly larger than the fans at the nearby Ripple Rock, Grizzly and Rocky Creek crossings. There are numerous and widespread colluvium slopes above the segment of the Hood Creek channel that is upstream of the highway crossing, therefore it is judged that Hood Creek generates relatively larger volumes of debris than other local creeks due to the large source areas and the limited debris storage available along the creek channel above the highway due to the narrow bedrock canyon.

AMEC recommends the following Risk Level factors for this site using the debris flow frequency-severity matrix:

- Probability Factor of 9 based on the debris accumulation noted along the channel upstream of the highway and the evidence (blocked culvert, recently cleared debris from the basin above the culvert inlet) of past debris flows/deposition.
- Consequence Factor of 5 due to the fact that the culvert is currently blocked by rocky debris (albeit with low volumes of creek flow able to percolate through) and that if the basin above the culvert inlet refills with debris in the future, it is possible that debris would be deposited onto the road and/or the creek flow would wash across the highway surface.

Therefore, the recommended Risk Level for this site is 45.

It is recommended that the debris blocking the existing culvert be cleared if possible and/or a supplementary culvert installed at this crossing. The creek flow appeared to be percolating through the debris in the culvert without significant delay during the site inspections in July and August 2005, however the ability of the culvert to carry spring flow levels without water ponding upstream of the highway is questionable. The most efficient solution is likely to install a second culvert at this site to act as an “emergency drain” if the water and debris level in the basin upstream of the highway rises above the existing culvert inlet. It would be preferable to install the second culvert using a trenchless method in order to minimize disruption to the highway. Clearing the existing culvert could be considered if some sort of mechanical assistance is possible, or even “hand mining” in the culvert if the associated safety issues, namely working in the confined space of the culvert subject to creek flow, could be addressed. It may be possible to pump the creek flow across the highway to bypass the culvert during the work.



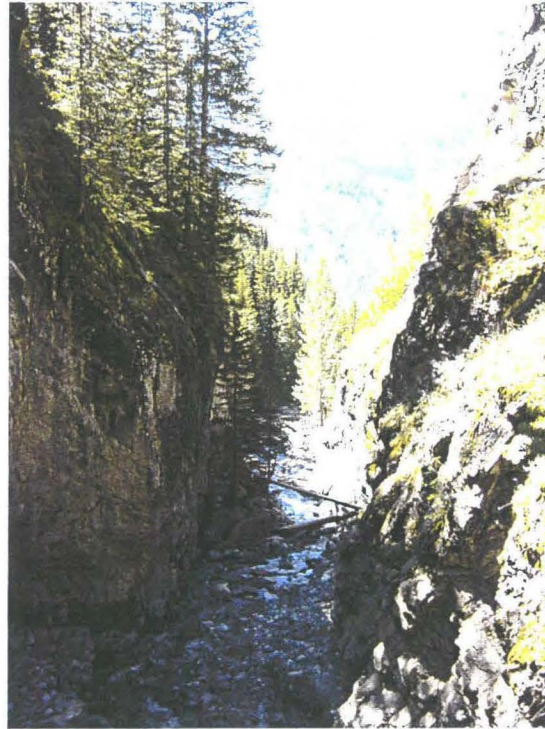
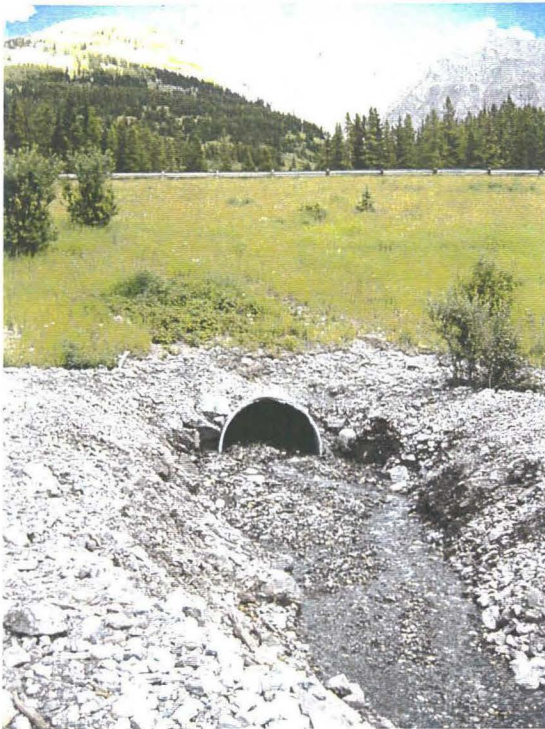


**Photo 1** (top) – Facing upstream along the Hood Creek channel from Highway 40. It is understood that prior to the site inspection in July 2005, the highway maintenance contractor removed a significant volume of debris that had accumulated in the channel and blocked the culvert. Note the “bathtub ring” effect showing the high water mark from before the debris was cleared. It appeared that debris had been excavated from along the channel for a distance of approximately 80 m upstream of the highway and that around the culvert inlet the thickness of debris that was excavated was in the order of 5 to 6 m. It is not known if the debris was deposited during a single event or had built up over multiple years.



**Photo 2** (bottom) – Facing downstream towards the culvert inlet. The culvert inlet was approximately 50% blocked with debris at the time of the July 2005 site inspection and it appeared that the culvert was fully blocked with debris further in. The low volume of creek flow at the time of the inspection was percolating through the debris in the culvert.





**Photo 3** (upper left) – Facing upstream towards the culvert outlet at the downstream toe of the highway embankment. The culvert outlet was approximately 50% blocked with debris at the time of the July 2005 site inspection and appeared to be fully blocked further in. It appeared that the debris along the channel immediately downstream of the outlet had been spread out and graded by heavy equipment, likely at the same time that the accumulated debris was loaded out from upstream of the culvert inlet.

**Photo 4** (upper right) – The creek channel upstream of the highway is typically confined within a narrow bedrock canyon. This photo shows a typical view of the channel near the outlet of the canyon, approximately 200 m upstream of the highway.

**Photo 5** (lower left) – Facing upstream along the segment of the creek channel confined within a narrow bedrock canyon. Note the volume of rock and wood debris present along the channel. The canyon walls also show a “high water” mark that was likely from peak flows during June 2005.