

Highway 940 – Upper Wilkinson Creek Valley, Km 82.5 Gully Erosion

This site is located approximately 82 km northbound from the junction between Highway 3 and Highway 940 at Coleman, AB, and approximately 9 km northbound from the junction between Highway 940 and Highway 532.

The site location is shown on Figures B1 and B6 in Appendix B. The site coordinates are listed in Table B1 in Appendix B.

This segment of Highway 940 is closed between December 1 and April 30 each year.

The site inspection was performed on September 27, 2008 by Mr. Andrew Bidwell, P.Eng. of AMEC.

Background

AMEC is not aware of any previously reported problems at this site.

A general description of the geological and climatic conditions in this area is presented in Section 5.2 of this report.

Site Observations

- The cutslope along the upslope edge of the road at this site is at approximately 30 to 32° inclination and exposes rocky soil with up to cobble and possibly even boulder-sized particles. Portions of the cut slope are treed, but the majority of the slope exposes rocky soil/colluvium. Photo 940-48 shows the cut slope.
- The road is approximately 9 m wide in this area.
- As shown in Photos 940-48 and 940-49, there is an erosion gully in the cutslope. The gully is greater than 20 m long, and extends for the length of the cutslope.
- There is a negligible to very small ditch along the toe of the cut slope. It appears that a debris lobe from the outlet of the gully encroached onto the road surface earlier in 2008. As shown in Photo 940-50, the portion of the debris lobe on the road surface had been graded clear earlier in 2008.

Assessment

The ditch capacity at this site is very limited and debris from the gully is prone to filling the ditch and then spilling onto the upslope side of the road. Presumably, any debris that accumulates when the road is closed to traffic between December 1 and April 30 each year is removed from the road when it is regraded at the start of each season.

However, any debris that flows onto the road when it is open to traffic between May 1 and November 30 will reduce the trafficable width of the road until the maintenance contractor can clear the debris.

The road is relatively narrow at this site (approximately 9 m width) and it would be very difficult to increase the road width and/or increase the capacity of the ditch to contain debris from the gully for the following reasons:

- It is not possible to widen the road in the downslope direction because that would require a reinforced and erosion-protected fill slope that would encroach into the Wilkinson Creek channel.
- The existing cut slope could be steepened in order to gain road and ditch width in the upslope direction, however this would be difficult to maintain because the existing cut slope appears to be marginally stable and a steeper cut at this location would result in greater amounts of material eroding and raveling down into the ditch and likely encroaching onto the road surface.
- The existing cut slope could also be pushed back while maintaining the same slope angle in order to widen the road, however this would require a much larger cut slope area extending further upslope from the road and likely generating larger volumes of debris that would need to be contained within and cleaned out from the upslope road ditch. The benefits of widening the road in this way would likely be offset by the increased volume of debris that would need to be cleaned out from the ditch.

Risk Level

The recommended Risk Level for this site, based on AT's general geohazard risk matrix, is as follows:

- Probability Factor of 9 due to the apparent ongoing erosion along the gully and deposition of debris filling the ditch and encroaching onto the road at certain times of the year.
- Consequence Factor of 2 because it appears that the debris on the road can be handled as a maintenance issue without requiring closure of the road.

Therefore, the recommended Risk Level for this site is 18.

Recommendations

It is recommended that AT continue to treat the debris from the gully as a maintenance issue, with any accumulated debris cleared from the road before it is opened to traffic

Alberta Transportation
Geohazards Review – Highway 940 Sites
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each year on May 1st and promptly if and when required to do so between May 1st and November 30th of each year.

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Photo 940-48 (top) – General view of the cut slope along the highway. Note that the gully headwall is around the crest of the cut slope, i.e. the gully runs the entire length of the cut slope.

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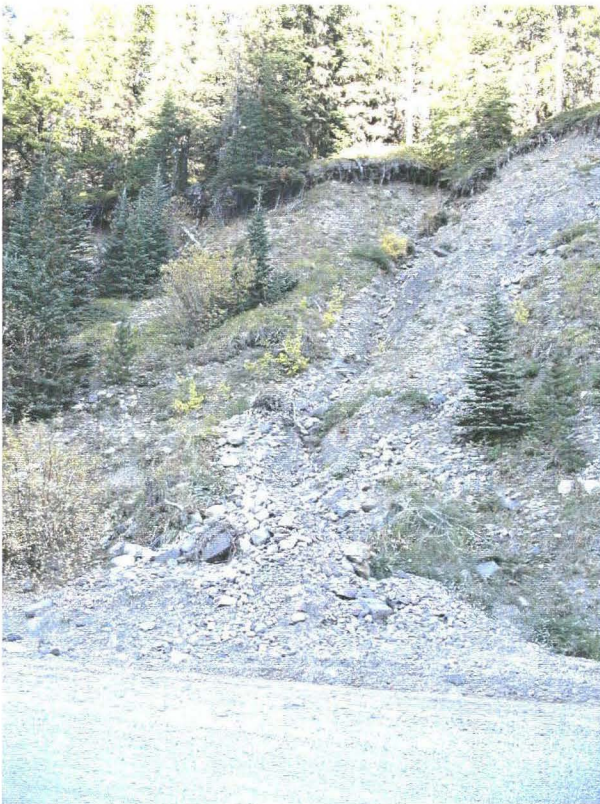


Photo 940-49 (bottom) – Closer view of the gully with the debris fan along the upslope edge of the road.



Photo 940-50 (top) – Facing northbound across the toe of the cut slope. Note how the debris from the gully extends to the upslope edge of the road and overflows from the negligible ditch. The lowermost portion of the fan had been graded out to clear the road earlier in 2008.