



December 2013

CG25399

Alberta Transportation  
2<sup>nd</sup> Floor, 803 Manning Road NE  
Calgary, AB T2E 7M8

**Attention: Mr. Ross Dickson**

Dear Ross:

**Re: Southern Region Geohazard Assessment  
2013 Annual Inspection Report  
Site Highway 549:02, Threepoint Creek**

This report documents the 2013 annual site inspection of the Threepoint Creek encroachment sites, along Highway 549:02, 6 km from the junction of Highway 549 and Highway 22 and approximately 6.2 km west of Millarville, Alberta.

AMEC Environment and Infrastructure (AMEC), a division of AMEC Americas Limited, performed this inspection in partial fulfillment of the scope of work for the supply of geotechnical services for Alberta Transportation's (AT's) Southern Region (AT contract CON0013506).

The site inspection was performed on May 29, 2013 by Bryan Bale, P.Eng., Hugh Wang, P.Eng., and Tyler Clay, E.I.T., of AMEC; and Roger Skirrow, P.Eng., and Ross Dickson of AT during the 2013 Annual Tour.

## **1.0 SUMMARY**

The site condition is relatively unchanged from the 2012 inspection with minor retrogression of the bank slope crests. The risk level has decreased to 18 for both encroachment areas from the 2012 level of 22 for the East site and 24 for the West site. A hydrotechnical assessment is recommended to better understand channel conditions and potentially aid in the design of any future mitigation. Mitigation involving bank armoring could slow the encroachment rate towards the highway. The site should be visually monitored and inspected next during the 2014 Annual Tour.

## **2.0 BACKGROUND**

The sites were first inspected by AMEC and AT personnel during the 2012 Annual Tour on June 19, 2012 following a call-out request made by AT.

AMEC Environment & Infrastructure  
A Division of AMEC Americas Limited  
140 Quarry Park Boulevard SE  
Calgary, Alberta, CANADA T2C 3G3  
Tel: +1 (403) 248-4331  
Fax: +1 (403) 248-2188  
www.amec.com

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A meandering creek (Threepoint Creek) runs to the south of the highway and has encroached towards the highway at two locations. The sites are approximately 1.5 km apart and will be referred to as the East and West sites. Figures 1 and 2, attached, show the overall site layouts and the relative location of the highway to the creek erosion. Refer to AMEC's 2012 call-out report<sup>1</sup> for a general description of the geohazard conditions and geological setting at the site.

### 3.0 SITE OBSERVATIONS

Key observations from the May 2013 inspection were as follows:

#### East Site

- The river flow was low at the time of the inspection relative to the previous inspection in 2012 and previous water levels based on high water marks.
- Seepage was observed coming from the exposed bank approximately 1 m above the water level.
- Another river channel was observed to the south that could possibly be used as a potential area to shift the current river.
- The crest was marked with stakes offset 1 m to monitor for future retrogression.
- The minimum offset measured between the bank crest and road shoulder was approximately 7.9 m.
- Overall, the site area appeared very similar to the 2012 conditions. Refer to Photo 1.

#### West Site

- There was shallow slumping along the bank that appeared to be fresh. Six of the fence posts were undermined due to bank erosion. Refer to Photo 2.
- The ditches were wet and a shallow translational slide was observed in the backslope. Refer to Photo 3.
- The minimum offset measured between the bank crest and road shoulder was approximately 4.8 m.

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<sup>1</sup> AMEC Environment & Infrastructure, 2012. *Southern Region Geohazard Assessment, Call-Out Report, 2007*, Project Number CG25263, Report submitted to AT on November 6, 2007

#### **4.0 ASSESSMENT**

The hazard to the highway at both sites is ongoing as bank erosion continues. There was approximately 0.1 to 0.2 m of bank retrogression since the 2012 inspection. The overall rate at which this hazard develops is dependent on the number of flood events and channel migration. Evaluation of these criteria could be improved by performing a hydrotechnical assessment and looking at historic channel movements. If it is determined that the risk to the highway will continue to increase then mitigation involving bank armouring or channel diversion should be considered.

During the recent inspection another river channel was observed to the south at the east site. Based on a 2012 air photo it appears the channel encroaching into the highway is a secondary channel meander that forms off a primary channel to the south within a low-lying flood plain. The encroaching meander likely only experiences significant flow during high water levels. It is possible that channel training or armouring work at the meander inlet could prevent flow towards the highway encroachment altogether; however, this process will potentially occur naturally over time. Further hydrotechnical assessment would be required to determine the feasibility of directing river flow away from the highway at the East site. The encroachment at the West site appears to be part of the main river channel and could not be diverted in this way; however there are potential old abandoned channels south of the current channel within the West site area.

#### **5.0 RISK LEVEL**

AMEC recommends the following Risk Levels for these sites, based on AT's general geohazard risk matrix:

##### **East Site**

- Probability Factor of 9, based on the ongoing erosion at a moderate rate between the 2012 and 2013 inspections. The scarp of the bank is expected to continually retrogress and cause settlement or damage to a portion of the road. Erosion and retrogression rates will likely increase during years of high precipitation.
- Consequence Factor of 2, reflecting the fact that a large sudden failure is unlikely and only one lane of the highway is currently affected. To date the remaining highway lane appears unaffected by the erosion and bank encroachment.

Therefore, the recommended Risk Level is 18 (i.e.  $9 \times 2$ ) and is decreased from the 2012 assessment of 22.

##### **West Site**

- Probability Factor of 9, ongoing erosion at a moderate rate between the 2012 and 2013 inspections. The bank scarp is expected to continually retrogress and cause settlement

or damage to a portion of the road. Erosion and retrogression rates will likely increase during years of high precipitation.

- Consequence Factor of 2, reflecting the fact that a large sudden failure is unlikely and only one lane of the highway is currently affected. To date the remaining highway lane appears unaffected by the erosion and encroachment.

Therefore, the recommended Risk Level is 18 (i.e.  $9 \times 2$ ) and is decreased from the 2012 assessment of 24.

## **6.0 RECOMMENDATIONS**

The 2012 recommendations remain valid and are provided below.

### **Short Term and Ongoing Maintenance**

- A hydrotechnical assessment should be performed to better understand channel conditions, occurrence of flood events and to potentially aid in the design for any future mitigation.
- The site should be inspected during the 2014 annual tour to check changing channel conditions and to measure the minimum bank offset from the road edge conditions following the June 2013 floods. The site should be inspected every other year during the annual tour with the inspection frequency adjusted based on the observed site conditions.
- The MCI should provide notification if significant cracking in the ditch or road surface is observed.
- If the width of the ditch clearance decreases further, a guardrail may be required.

### **Long Term**

Bank armouring could be considered to slow the rate of retrogression. Alternatively, options involving the feasibility of channel re-alignment could be evaluated.

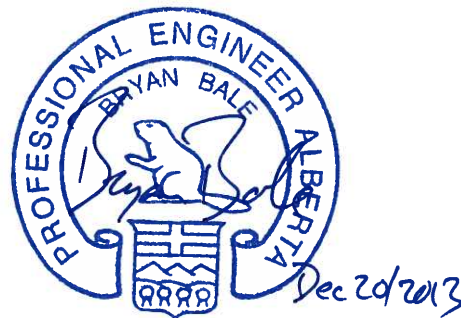
## 7.0 CLOSURE

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We trust that this meets your needs at this time. Please contact the undersigned if you have any questions or require any further information.

Respectfully Submitted,

**AMEC Environment & Infrastructure,  
a division of AMEC Americas Limited**



Tyler Clay, B.A.Sc., EIT  
Geological Engineer

Bryan Bale, M.Sc., P.Eng.  
Senior Geotechnical Engineer

APEGA Permit to Practice No. P-04546

Reviewed by:  
Georgina Griffin, M.Eng., P.Eng.  
Associate Geotechnical Engineer