

**PEACE REGION – SWAN HILLS
GEOHAZARD RISK ASSESSMENT
SITE INSPECTION FORM**

SITE NUMBER SH 26	SITE NAME Gunns Creek North Embankment Failure	HIGHWAY & KM HWY 2A:54	PREVIOUS INSPECTION DATE 04 July 2014	INSPECTION DATE 24 June 2015
LEGAL DESCRIPTION LSD 16-34-76-14 W5M	NAD 83 UTM COORDINATES N 6146169 E 500409	PREVIOUS RISK ASSESSMENT		
		PF: 12	CF: 4	TOTAL: 48
		CURRENT RISK ASSESSMENT		
		PF: 12	CF: 4	TOTAL: 48

SUMMARY OF SITE INSTRUMENTATION: No Instruments	INSPECTED BY: Amec Foster Wheeler: Curtis Treen, Dustin McLachlan, Vincent Huang, Glenn Newman Alberta Transportation: Ed Szmata, Rishi Adhikari Vincent Huang, E.I.T. Geotechnical Engineer  Dustin J. McLachlan, P.Eng. Senior Geological Engineer Reviewed by: Curtis R. Treen, M.Eng., P.Eng. Senior Associate Geotechnical Engineer Amec Foster Wheeler Environment & Infrastructure Permit Number: P 04546
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PRIMARY SITE ISSUES: North Embankment <ul style="list-style-type: none"> Embankment failure on the north slope of a 20 m high embankment fill (Slide A) was first noted in Spring 2007. Retrogression of the headscarp has been on-going since. The exposed soils observed along the backscarp of the slide consisted of high plastic clay and the soils within the main body of the slide were soft and wet. Minor seepage was observed from the face of the headscarp. A second failure, Slide B, with a scarp 0.3 m to 0.5 m high is located 3 m downslope from the guardrail on the eastern side of north embankment and approximately 50 m east of Slide A. Between Slide A and Slide B, tension cracks and shallow slide scarps were observed. The tension cracks and shallow slide scarps had been observed in this same area during the 2013 and 2014 site visit, indicating that this zone may represent a retrogression of Slide A or a separate slide. Shallow slope failure beyond the toe of the north embankment on the west bank of Gunns Creek (Slide C). Erosion of east and west banks of Gunns Creek adjacent to the culvert inlet. Sinkhole immediately upslope and adjacent to the west side of the culvert inlet. South Embankment (expired geohazard Site SH15) <ul style="list-style-type: none"> Slumping of rip rap on west bank of Gunns Creek downstream of culvert outlet. Rip-rap had been placed by AT around the culvert outlet between the 2013 and 2014 site visits to mitigate erosion. <p><u>Note:</u> Refer to previous inspection reports for further details.</p>
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APPROXIMATE DIMENSIONS:

Slide A:

- Bowl shaped failure approximately 40 m by 40 m in plan.
- Scarp height varies up to 2 m in height.
- Pronounced toe bulge at the foot of the slide varied from 1 m to 2 m above grade.
- Headscarp had retrogressed from pavement edge to the guardrail at the time of the 2014 inspection.

Slide B:

- Bowl shaped failure approximately 15 m wide and 21 m from toe to scarp.
- Scarp height varied from 0.3 m to 0.5 m and the toe bulge at foot of the slide was approximately 1 m above grade.
- Approximate centreline of the failure located approximately 50 m east of the top of Slide A.

Tension cracks and shallow slide scarps:

- A wet zone with tension cracks and shallow slide scarps up to 150 mm in height was observed between Slide A and Slide B.

Slide C (shallow slump near culvert inlet, named following 2014 inspection):

- Shallow slump approximately 12 m wide by 15 m long in 2014.
- Erosion extends approximately 10 to 15 m upstream to the north of the culvert along both the east and west banks of the creek.
- A sinkhole, approximately 1.5 m in diameter, was observed near the culvert inlet

REMEDIAL ACTIONS:

Previous reports indicate repairs to a historical failure on the north embankment may have been carried out in the early 1990s, however there is no detailed information on this repair.

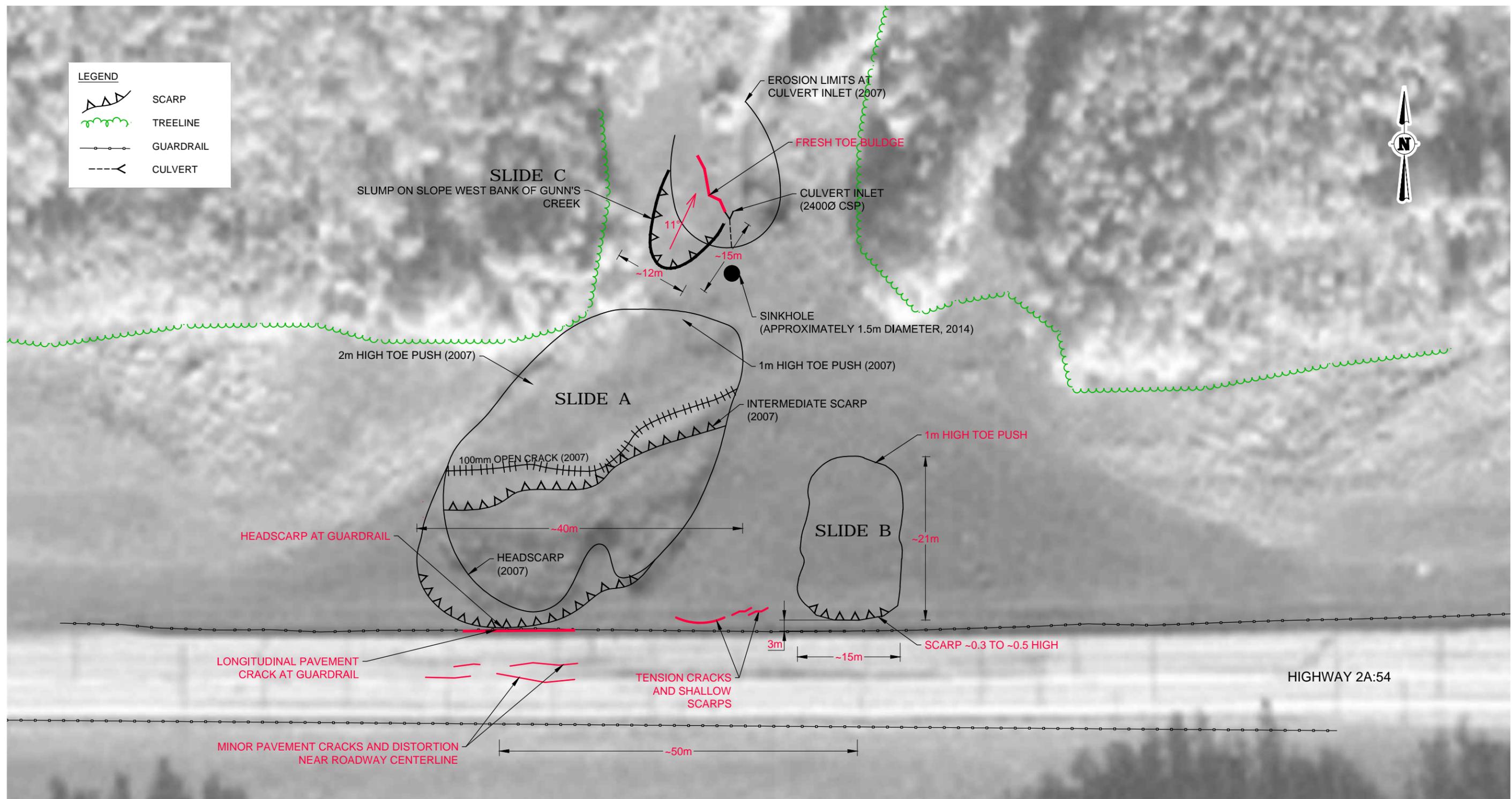
ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION		
	YES	NO		YES	NO	SEE COMMENTS
PAVEMENT DISTRESS	X		The headscarp of Slide A has retrogressed to the guardrail and into the pavement. A slight vertical sag in the guardrail at the headscarp of Slide A (see Photo 3). Some minor pavement cracking and deformation was noted near the centerline of the roadway (see Figure 1).	X		X
SLOPE MOVEMENT	X		Bowl shaped slope failure approximately 40 m by 40 m in plan (Slide A). Bowl shaped slope failure approximately 15 m wide by 21 m long (Slide B) and tension cracking and shallow scarps between Slide A and B. Shallow failure beyond the toe of the north embankment on west bank of Gunns Creek, approximately 12 m wide by 15 m long. (Slide C)	X		X
EROSION	X		Erosion and slumping of east and west banks of Gunns Creek adjacent to the culvert inlet. Sinkhole immediately upslope and adjacent to the culvert inlet approximately 1.5 m in diameter. Minor erosion of the south bank of Gunns Creek near the culvert outlet.	X		X
SEEPAGE	X		Soils within the main body of the embankment failure (Slide A) were soft and wet. Minor seepage was observed on the face of the headscarp.		X	

COMMENTS/RECOMMENDATIONS:

Continued retrogression and toe bulging of the Slide A and Slide B was observed during the 2015 inspection (Photos 1 to 3). At the headscarp of Slide A, the pavement edge was exposed and had started to detach from the roadway. The shallow failure (Slide C) on the north embankment of Gunns Creek had continued to slump towards the creek between 2014 and 2015 (Photo 4). The three slides will be repaired in 2015.

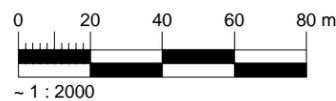
Remedial measures for this site are currently undergoing engineering as part of the Flood Mitigation work. Amec Foster Wheeler submitted a detailed design report in July 2015. The remedial measures will consist of excavation of the failed slope materials at Slides A, B and C, installation of drainage measures at Slide A and B, and reconstruction of the slopes. Construction is scheduled to start later in 2015. Inspection of the site should be continued following construction to evaluate the effectiveness of the remedial measures.

The south embankment (expired Site SH15) was also visited at the time of the 2015 inspection. Minor erosion of the south bank of Gunns Creek near the culvert outlet was observed during the 2014 and 2015 inspections (Photos 7 and 8). Following the addition of rip rap between the 2013 and 2014 inspections, erosion has decreased and no significant changes were observed between the 2014 and 2015 inspections.



REFERENCE: IMAGERY DATED SEPTEMBER 15, 2009 PROVIDED BY DIGITALGLOBE. ACCESSED ON DECEMBER 9, 2014.

- NOTES:
- 2007 ANNOTATIONS BASED ON HAND SKETCH BY THURBER ENGINEERING LTD. DATED JUNE, 2007. PROVIDED BY ALBERTA TRANSPORTATION.
 - FEATURE LOCATIONS ARE APPROXIMATE.
 - PREVIOUS OBSERVATIONS SHOWN IN BLACK.
 - JUNE 24, 2015 OBSERVATIONS SHOWN IN RED.



CLIENT:



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DWN BY:

VH

CHK'D BY:

DJM

DATUM:

PROJECTION:

APPROXIMATE SCALE:

~ 1:2000

PROJECT:

GEO HAZARD ASSESSMENT
PEACE REGION (SWAN HILLS)

TITLE:

SH26: HWY 2A:54
GUNNS CREEK NORTH EMBANKMENT FAILURE
~9km EAST OF HWY 49 JUNCTION
SITE PLAN

DATE:

JULY, 2015

PROJECT No.:

EG10030

REV. No.:

A

FIGURE No.:

FIGURE 1



Photo 1: (looking east)
Overall view of Slides A and B from western approach



Photo 2: (looking south)
Slumped mass of Slide A.



Photo 3: (looking west)
Exposed headscarp of Slide A. Tension cracking near the headscarp of Slide A adjacent to guardrail. Note the slight sag in the guardrail.



Photo 4: (looking west)
Shallow slumping (Slide C) on west bank of Gunns Creek. Fresh toe bulge apparent.



Photo 5: (looking north)
Erosion of east and west banks of Gunns Creek adjacent to the culvert inlet. Note beaver dam in background.



Photo 6: (looking northeast)
Geotextile and riprap placed around culvert outlet between 2013 and 2014 inspections. No discernible displacement of riprap has occurred since the 2014 inspection.



Photo 7: (looking south)
Erosion near culvert outlet at south embankment.