GEOHAZARD RISK MANAGEMENT PROGRAM
North Central Region – Edson / Stony Plain Area

2019 Inspection Report

Site Number	Site Name		Hwy	km
NC50	Gregg River Slide (North of Cadomin)		40:28	11.7
Legal Land Description	NW 33-47-24-W5M			
UTM Coordinates (NAD 83)	Zone 11U	N5883275	E469398	
Operational Site Instrumentation	**Slope Inclinometers**		4	
	Pneumatic Piezometers		3	
	Vibrating Wire Piezometers		0	
	Standpipe Piezometers		0	
Date of Last Instrumentation Readings	May 9, 2019			

Risk Assessment	Date	PF	CF	Risk Ranking
Current Inspection	May 16, 2019	3	4	12
Previous Inspection	May 31, 2018	3	4	12
Report Attachments	☒ Photographs (14 photos)	☒ Site Plans (2 pages)		

	Stantec	Alberta Transportation
Inspected By	Leslie Cho, Junwen Yang, and Xiteng Liu	Kristen Tappenden, Kathleen Davis, Paul Macaraeg, Howard Hawley
Date of Remediation	2010 – Installed 70 m long pile wall along	

	north shoulder of Highway 40		
Recent Maintenance	Repaired separation of half-round culvert in 2015. South ditch cleaned of slump material in summer 2016. Ditch blocks removed from south ditch in 2017.		
Primary Site Issue	Pile Wall Site: Surficial movement west of the pile wall and along the backslope south of the highway. Ponded water in ditch. Culvert Site: Slope movement into Gregg River. Potential for regression of surficial slides upslope toward highway.		
Observations	**Description and Location**	**Change from Previous Inspection**	
☐ Pavement Distress		☐ Yes	☐ No
☒ Culvert Distress	Twisting of the braces/supports at the two half-round culverts.	☐ Yes	☒ No
☐ Bridge Distress		☐ Yes	☐ No
☒ Slope Movement	New cracks along pile wall location. New crack 40 m west of retrogressive scarp.	☒ Yes	☐ No
☒ Erosion	Surface erosion north of SI0-11 extended to HWY40. Erosion gully with flowing water south of scarp near SI09-10 and PN09-10. Erosion along north ditch west of SI10-13.	☐ Yes	☒ No
☒ Seepage	Seepage east of half-round culvert at skin slide area. Ponded water south of SI09-10 and south of HWY40.	☐ Yes	☒ No
☐ Other	Wet ground in the ditch south of SI09-10 up to SI10-13.	☐ Yes	☒ No

Discussion

Pile Wall Site:

No new pavement cracks were observed around the pile wall as shown in Photo 1.

New ground cracks approximately 40 m west of the retrogressive scarp was observed as shown in Photo 2. The crack locations are in similar locations of previously observed cracks. It is unknown which year the crack was first observed.

In general, the old retrogressive scarp appeared to be in similar condition to the 2015 inspection. A new crack was observed several meters upslope from the scarp as shown in Photo 3. The vertical differential in the original scarp ranged from 600 mm to 1700 mm.

Soft wet ground with minor surficial erosion was observed in the ditches west of SI10-13 as shown in Photo 4. At localized spots, seepage from the ground was observed to be orange.

The culvert east of SI10-11 was flowing and in good condition as shown in Photo 5. The erosion gully at this culvert appeared similar to the 2018 inspection as shown in Photo 6.

An erosion gully east of SI10-11 leading upslope from the culvert to Highway 40 was observed as shown in Photo 7.

At the base of SI10-11, a slump/crack feature about 300 mm high was observed as shown in Photos 5 and 7. This appeared to be similar to the 2018 inspection.

New cracks along the approximate pile wall alignment was observed between SI10-11 and SI10-13 as shown in Photo 8.

Skin slides along the back slope with ponded water in the ditch continued to be observed south of Highway 40 as shown in Photo 9. No obvious changes to the skin slides were observed.

Culvert Site:

The pavement cracks remain relatively unchanged since the previous inspection.

The scarps in the upper half of the slope appear to be relatively unchanged as shown in Photo 10 and 11. Seepage continued to be observed within the slope. The lower half of the slope was obscured with ice and snow and could not be observed.

The slump east of the broken culvert and in the trees appeared unchanged as shown in Photo 10.

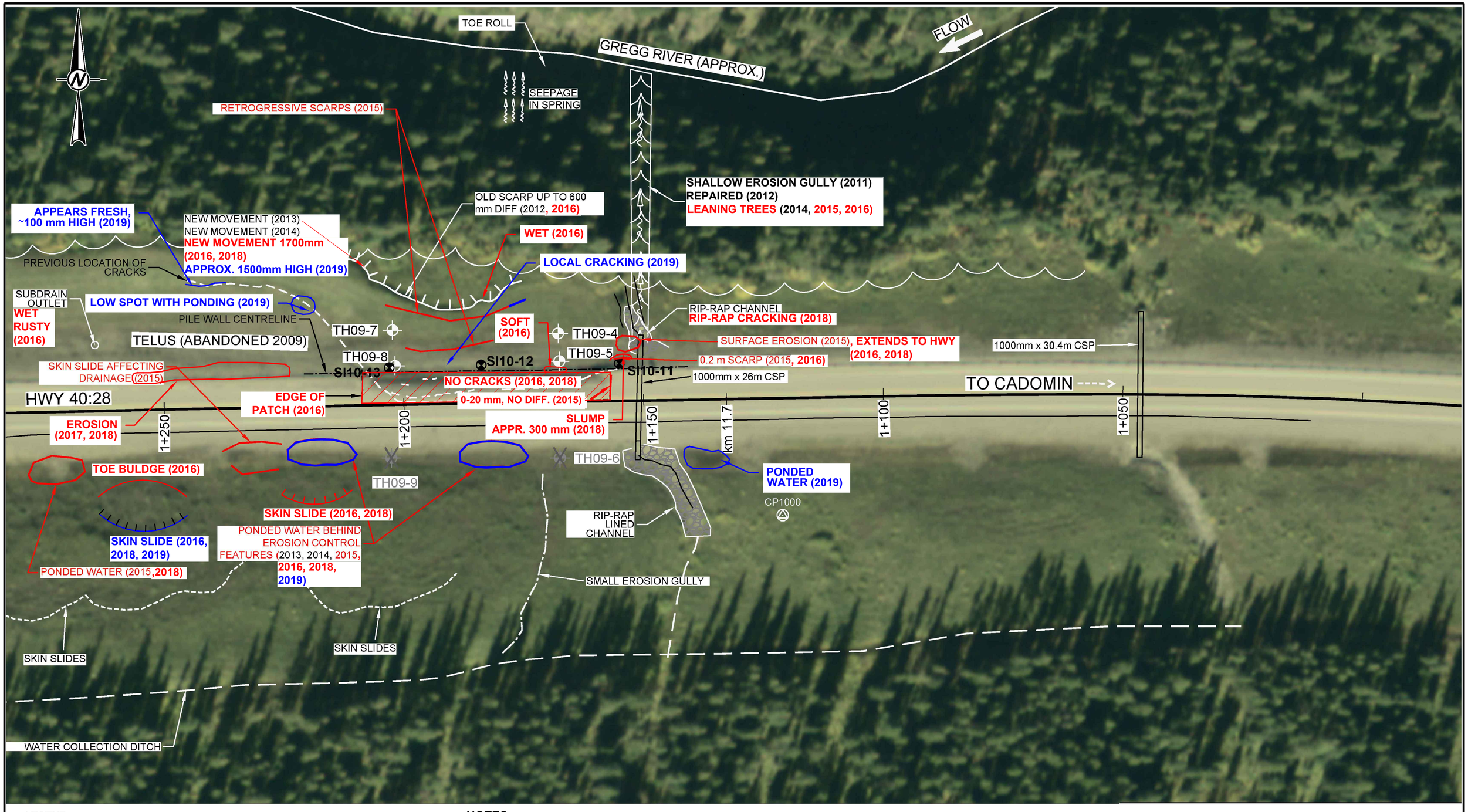
The slump north of SI09-10 as shown in Photo 12 appeared to be slightly larger with fresh scarps approximately 2 m high.

The old scarp south of SI09-10 appeared to be similar to previous inspections with no obvious changes as shown in Photo 13.

Although the south ditch was recently regraded, the ground continued to be wet with occasional ponded water.

The half culverts could not be observed during this inspection due to ice cover as shown in Photo 14. However, the sound of flowing water can be heard at the half culverts.

Assessment	<u>Pile Wall Site:</u> No new pavement cracks were observed near the pile wall or within the most recent asphalt patching of the west bound lane. Very little slope movement (less than 5 mm) was observed in the pile wall slope inclinometers (SI10-11 to SI10-13) indicating satisfactory performance of the pile wall. SI09-7 was found to be sheared off during the spring 2017 instrument readings suggesting on-going slope movements downslope of the pile wall. The current inspection showed new ground cracks developing behind the retrogressive scarp which further suggests on-going slope movements. Additionally, SI09-5 located downslope of the pile wall, is showing an average rate of movement of about 5 mm/yr. Currently, the scarp downslope from the pile wall is not expected to be a significant risk to the embankment. Pore pressures have been stable since 2009. However, a trend of increasing pore pressures is developing in PN09-5 with the highest recorded pore pressure being recorded in Spring 2019 at 9.1 m below ground surface. The increasing pore pressure may be related to the slope movements observed downslope. <u>Culvert Site:</u> The slumps observed at the site suggest on-going slope movements. No immediate risk to the highway is expected from the slope movement; however, potential for regression upslope still exists. The pavement cracking may also indicate potentially deeper-seated movement. The seepage at the site may be an indication of high pore pressures within the slope.
Recommendations	Short term recommendations include sealing any cracks to reduce surface water infiltration into the slope and pavement structure, regrading the north and south ditches of the highway to reduce the risk of pore pressure buildup from ponded water, and regularly monitoring the scarps for signs of regression upslope. Additionally, the culverts should be regularly inspected to reduce the risk of water seeping into the slope. Since the pile wall is showing satisfactory performance, long term remediation measures at the pile wall site are not required at this time. Instrumentation readings at the site should continue to be collected semi-annually, with site inspections completed annually.



LEGEND

- APPROXIMATE LOCATION OF 2010 SLOPE INCLINOMETER
- APPROXIMATE LOCATION OF PREVIOUS TEST HOLES
- DESTROYED SLOPE INCLINOMETER OR STANDPIPE PIEZOMETER

NOTES

1. FEATURE LOCATIONS ARE APPROXIMATE
2. PREVIOUS OBSERVATIONS SHOWN IN BLACK
3. 2015-18 OBSERVATIONS SHOWN IN RED
4. 2019 OBSERVATIONS SHOWN IN BLUE

REFERENCE

THURBER ENGINEERING LTD, PROJECT #15-16-258,
ORIGINAL SCALE 1:1,000, DATE AUGUST 2011.

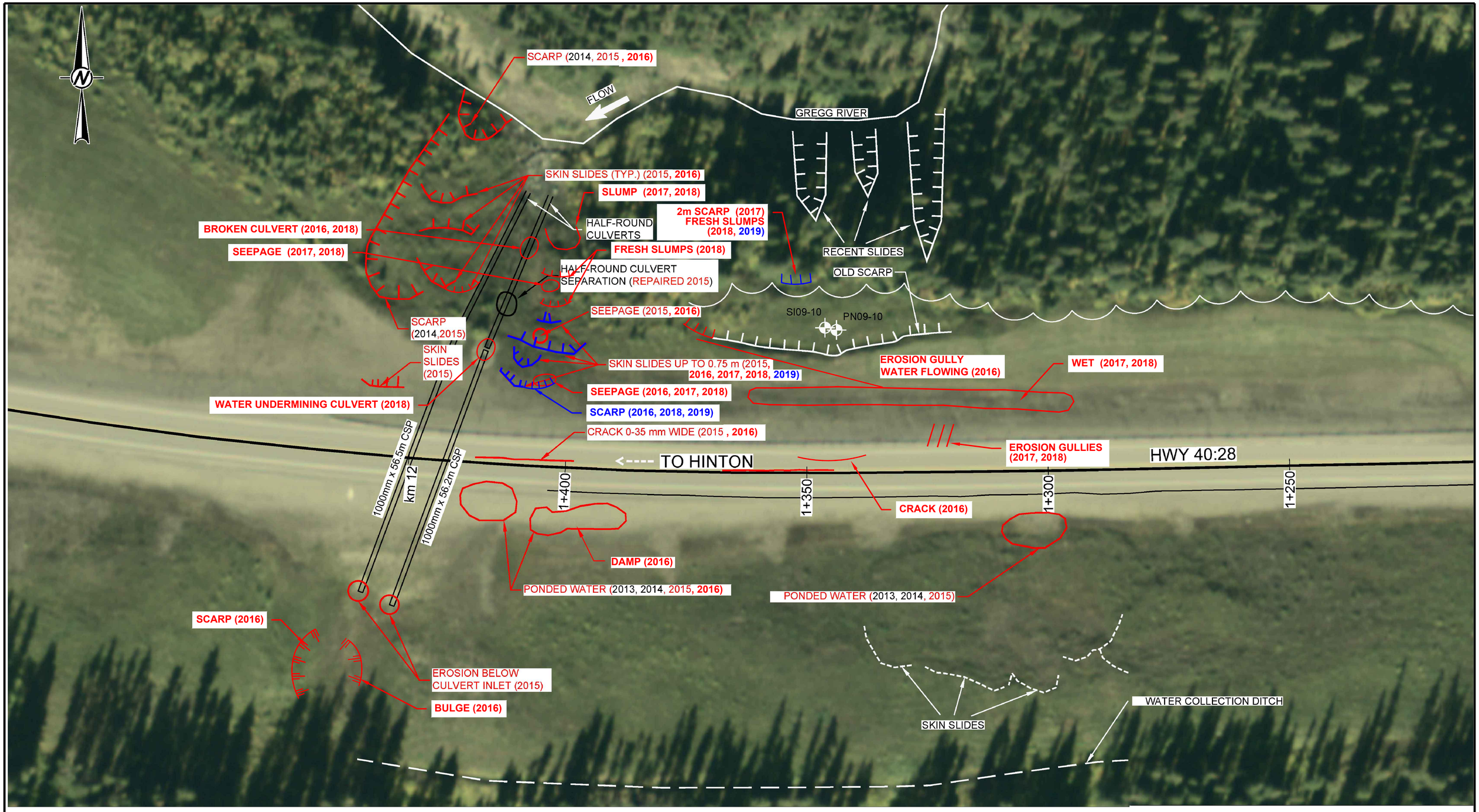
0 20 40 60
SCALE METRES

Stantec
STANTEC CONSULTING
400-10220 103 AVENUE NW
EDMONTON, ALBERTA, CANADA
T5J 0K4

ALBERTA TRANSPORTATION
GEOHAZARD MONITORING PROGRAM
NC50 NORTH OF CADOMIN
PILE WALL SITE PLAN

DRAWN WW / MK	CHECK XL	APPROVE LC
DATE 17 JUL 2019	SCALE AS SHOWN	PROJECT # 123312435

FIGURE 1 -



LEGEND

- APPROXIMATE LOCATION OF 2010 SLOPE INCLINOMETER
- APPROXIMATE LOCATION OF PREVIOUS TEST HOLES

NOTES

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ALBERTA TRANSPORTATION
GEOHAZARD MONITORING PROGRAM
NC50 NORTH OF CADOMIN
CULVERT SITE PLAN

DRAWN WW / MK	CHECK XL	APPROVE LC
DATE 18 JUL 2019	SCALE AS SHOWN	PROJECT # 123312435

FIGURE - 2 -

Reference: 2019 Annual Inspection Photographs at NC50 – Gregg River Slide
File Number: 123312435

Photo 1: Previous asphalt patch south of pile wall appears unchanged. Cracking along pavement joints. Looking west.

Photo 2: New ground cracks west of retrogressing scarp in Photo 3. Looking west.

Reference: 2019 Annual Inspection Photographs at NC50 – Gregg River Slide
File Number: 123312435

Photo 3: Retrogressive scarp from 2015 with vegetation growing in. New ground crack developing left of centre. Looking west.

Photo 4: Soft saturated ground with minor erosion leading from culvert site to pile wall site. Orange seepage. Looking south.

Reference: 2019 Annual Inspection Photographs at NC50 – Gregg River Slide
File Number: 123312435

Photo 5: Culvert east of SI10-11 in flowing and in good condition. Ice in culvert. Slump at base if SI10-11 in top right about 300 mm high. Looking north.

Photo 6: Erosion gully beyond the rip rap channel at the culvert outlet. Vegetation growing into gully. Looking north.

Reference: 2019 Annual Inspection Photographs at NC50 – Gregg River Slide
File Number: 123312435

Photo 7: Erosion gully east of SI10-11. Slump/crack feature at base of SI10-11. Looking southwest.

Photo 8: Ground cracking along approximate pile wall location. Looking east.

Reference: 2019 Annual Inspection Photographs at NC50 – Gregg River Slide
File Number: 123312435

Photo 9: Skin slide south of Highway 40. Ponding in ditch. Looking southeast.

Photo 10: Highest scarp east of the half-round culverts. Looking west.

Reference: 2019 Annual Inspection Photographs at NC50 – Gregg River Slide
File Number: 123312435

Photo 11: Highest scarp east of the broken culvert. Looking southeast.

Photo 12: Retrogressing 2 m scarp north of SI09-10. Looking west.

Reference: 2019 Annual Inspection Photographs at NC50 – Gregg River Slide
File Number: 123312435

Photo 13: Old scarp south of SI09-10 appears unchanged. Looking west.

Photo 14: Snow and ice obscuring the slope. Looking north.