

<b>SITE NUMBER AND NAME:</b> C070 West and East Slides		<b>HIGHWAY &amp; KM:</b> 27:10, 18.932 & 33.102	<b>PREVIOUS INSPECTION DATE:</b> June 13 & 14, 2017	<b>INSPECTION DATE:</b> June 13, 2018
<b>LEGAL DESCRIPTION:</b> 02-18-031-21 W4M 15-07-031-21 W4M 02-16-031-20 W4M	<b>NAD 83 COORDINATES:</b> UTM    Northing    Easting 12      5723837    363877 12      5723487    377005		<b>RISK ASSESSMENT:</b> PF: 9    CF: 4    TOTAL: 36 PF: 9    CF: 4    TOTAL: 36	
<b>AVERAGE ANNUAL DAILY TRAFFIC (AADT):</b> 1790 (west) & 1850 (east) (Ref No. 108260 is between both sites)			<b>CONTRACT MAINTENANCE AREA (CMA):</b> 20	

<b>SUMMARY OF SITE INSTRUMENTATION:</b>  Operational: One vibrating wire piezometer (VWP) and one slope inclinometer (SI) installed at the C070W site in March 2017.  Inoperable: One vibrating wire piezometer (VWP) and one slope inclinometer (SI) installed at the C070E site in March 2017.  LAST READING DATE: May 22, 2017	<b>INSPECTED BY:</b> Chris Gräpel (KCB) Ryan Gazley (KCB) Rocky Wang (AT) Tony Penney (AT)
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**PRIMARY SITE ISSUE:** Two shallow slope failures in the highway embankment fill that are triggered by surface water flowing onto the slide area during periods of heavy or prolonged rainfall, and a high groundwater table. The West Slide and East Slide are located on the south (eastbound lane) and north (westbound lane) side of Hwy 27, respectively. Both slides have reached the edge of pavement, and the west slide has undermined the guardrail.

**APPROXIMATE DIMENSIONS:** West Slide: The slide is approximately 17 m wide at the crest, and the highway embankment is approximately 6.5 m high sloped at approximately 2.5H:1V. East Slide: The slide is approximately 85 m wide at the crest, and the highway embankment is approximately 5 m high sloped at approximately 3H:1V.

**DATE OF ANY REMEDIAL ACTION:** 2003 – West Slide repaired; 2015 – West and East Slides repaired by pushing failed material back upslope, reshaping, and seeding. Slopes failed again after 2015 repair.

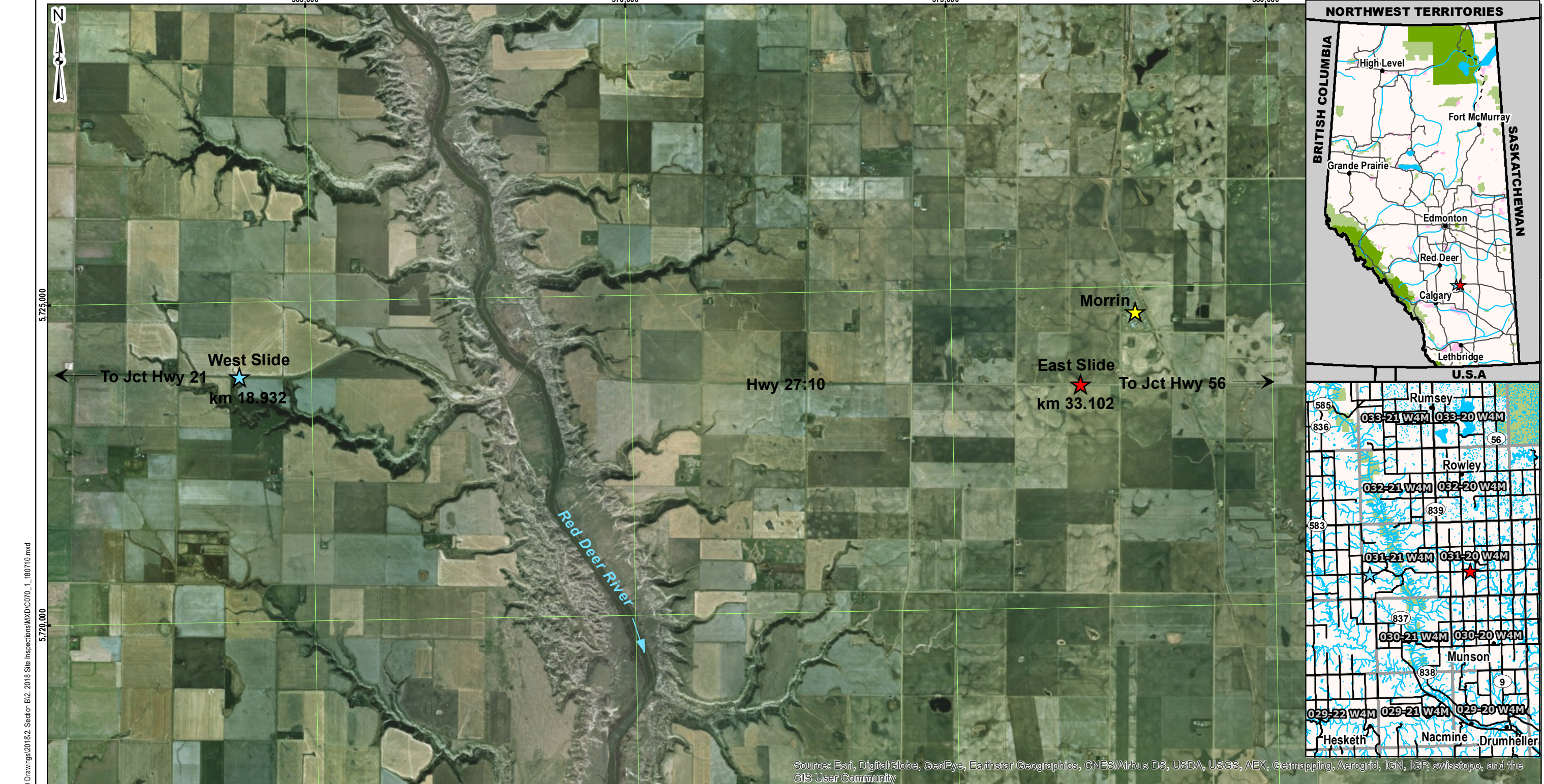
ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress	X		West Slide: pavement undermined, three guardrail posts hanging; East Slide: pavement cracked	X	
Slope Movement	X		West Slide: fence damaged by toe roll	X	
Erosion		X	None observed		X
Seepage		X	None observed		X
Culvert Distress	X		Culvert outlets partially buried at both sites		X

**COMMENTS**

At the East Slide:

- Slide area has become well vegetated with numerous cracks along the slope
- CNRL gas well access road to the north of the slide area has been reclaimed and seeded, with some fill removed.
- Slide has widened towards the west by 1.5 to 2.0m
- Slide head scarp is approximately 1.7 m high at edge of pavement (waypoint 702)

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
			<ul style="list-style-type: none"> <li>Between the 2017 inspection and Spring 2018 instrument readings, the instruments (VWP and SI) at the site were struck by a vehicle and destroyed.</li> </ul>		
			<p>At the West Slide:</p> <ul style="list-style-type: none"> <li>No discernable movement observed since inspection in 2017</li> <li>Three guardrail posts remain unsupported and the south edge of pavement continues to be impacted (approximately 0.3 m of asphalt lost)</li> </ul>		
			<p>KCB and AT discussed the idea of using material from existing stockpile at C070W located southwest of the slide area for the scheduled repairs at C070E and C070W. The pad could also be used to stockpile waste material from both sites.</p>		
			<p>Based on instrumentation data collected and visual observations, the slides appear to be rotational-embankment failures caused by placing poor quality and/or compacted fill beneath the slopes of the embankment, as well as poor foundation preparation. In addition to poor quality fill, the slide movements are likely exacerbated by poor surface drainage.</p>		
			<p>Repair of both sites is expected to be completed in Fall 2018 as part of the works included in the Alberta Transportation Tender TND0019153. The repair will involve excavating the failed slopes and backfilling with geosynthetic reinforced gravel fill with a shear key.</p>		



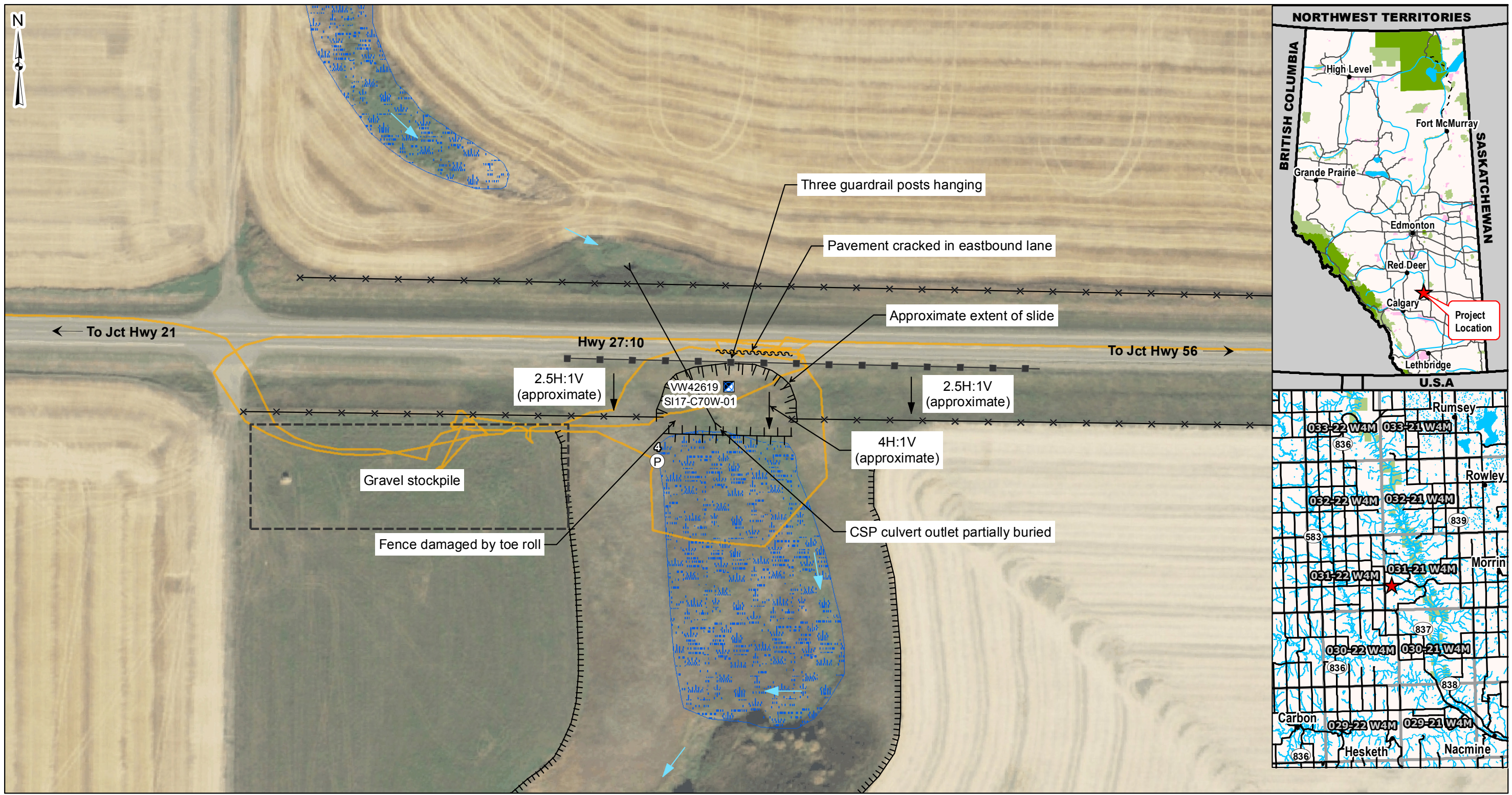
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



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 Date: July 10, 2018  
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<b>NOTES:</b> 1. HORIZONTAL DATUM: NAD83 2. GRID ZONE: UTM Zone 12N 3. IMAGE SOURCE: World Imagery, ESRI ArcGIS Online. Image dated 2009/2010	CLIENT 	PROJECT CENTRAL REGION GEOHAZARD RISK MANAGEMENT PROGRAM
		TITLE Site Location Plan C070 - West and East Slides Hwy 27:10, km 18.932 and 33.102
	SCALE 1:60,000	PROJECT No. A05115A02
		FIG No. 1

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 Date: July 10, 2018  
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**Legend**

- |                                  |                  |                    |
|----------------------------------|------------------|--------------------|
| (P) Photo Location               | —■— Guardrail    | ----- Top of Slope |
| ⊗ Vibrating Wire Piezometer (VW) | —< Culvert       | → Flow Direction   |
| ■ Slope Inclinometer (SI)        | ~~~~~ Crack      | ⊗ Wet Area         |
| — GPS Track (June 13, 2018)      | ┌┐┌ Scarp        |                    |
| ×—× Fence                        | └└└ Toe of Slide |                    |



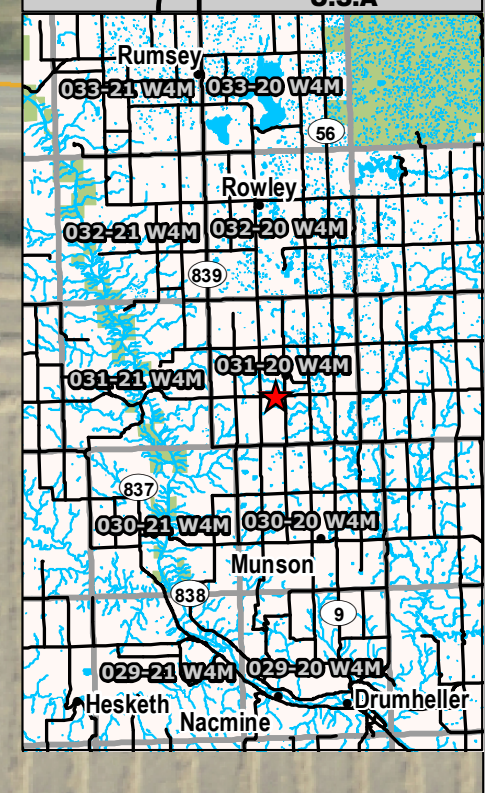
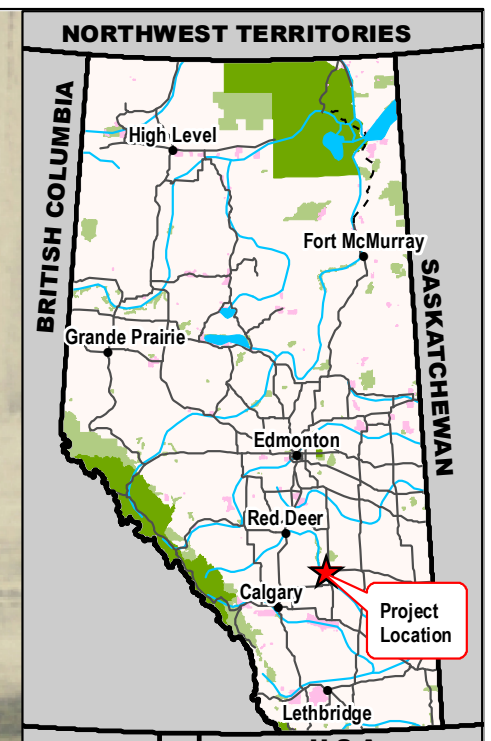
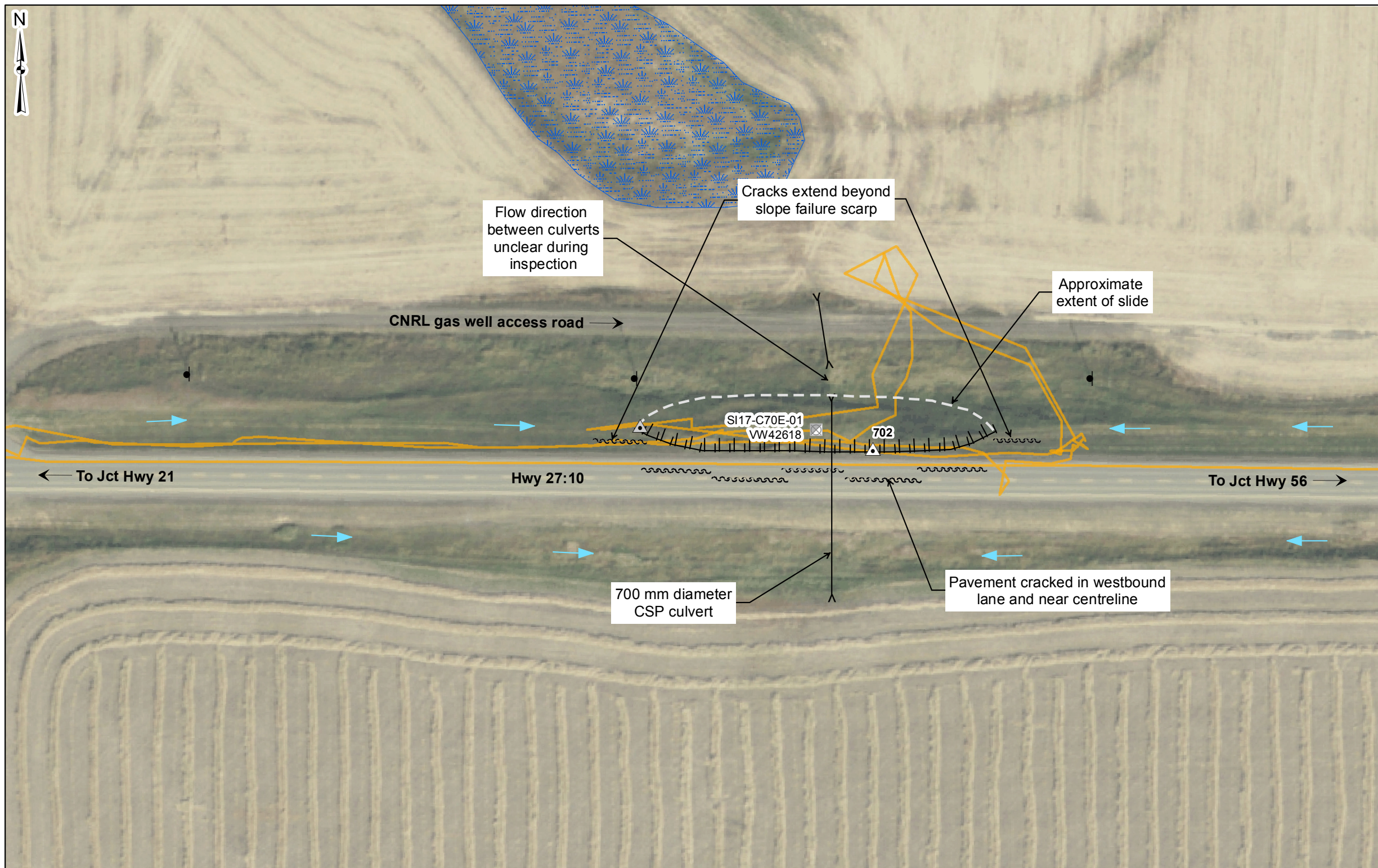
**NOTES:**  
 1. HORIZONTAL DATUM: NAD83  
 2. GRID ZONE: UTM Zone 12N  
 3. IMAGE SOURCE: Abacus Datagraphics Ltd.  
 Image dated July 5, 2011 to October 7, 2011  
 4. Location of instruments is approximate (not surveyed)

CLIENT

*Alberta*

**Klohn Crippen Berger**

PROJECT	CENTRAL REGION GEOHAZARD RISK MANAGEMENT PROGRAM	
TITLE	Site Plan C070 - West Slide Hwy 27:10, km 18.932	
SCALE	PROJECT No.	FIG No.
1:1,200	A05115A02	2



**Legend**

- ▲ GPS Waypoint
- ▲ Collector Waypoint
- Slope Inclinometer (SI) (inoperable)
- ⊗ Vibrating Wire Piezometer (VW) (inoperable)
- Power Pole
- GPS Track (June 13, 2018)
- >< Culvert
- ~ Crack
- ⊥ Scarp
- Flow Direction
- ☁ Wet Area



**NOTES:**  
 1. HORIZONTAL DATUM: NAD83  
 2. GRID ZONE: UTM Zone 12N  
 3. IMAGE SOURCE: Abacus Datagraphics Ltd.  
 Image dated July 5, 2011 to October 7, 2011  
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CLIENT

*Alberta*

**Klohn Crippen Berger**

PROJECT CENTRAL REGION GEOHAZARD RISK MANAGEMENT PROGRAM		
TITLE Site Plan C070 - East Slide Hwy 27:10, km 33.102		
SCALE 1:1,000	PROJECT No. A05115A02	FIG No. 3

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**Photo 1** View of the C070E slide area. Cracking can be observed along the well vegetated slope. Photo taken June 13, 2018 looking east.



**Photo 2** View of the destroyed VWP and SI that was installed in March 2017 at C070E. Photo taken June 13, 2018 looking north.



**Photo 3** Location where the head scarp is at the edge of asphalt at C070E (waypoint 702). Photo taken June 13, 2018 looking northeast



**Photo 4** View of the C070W slide area. No discernible movement of the backscarp was observed. Three guardrail posts remain unsupported. Photo taken June 13, 2018 looking northeast.



**Photo 5** Longitudinal cracking in the eastbound lane at C070W appears slightly wider since the 2017 inspection. Photo taken June 13, 2018 looking northeast.



**Photo 6** Gravel stockpile and pad adjacent to C070W that could be used for the C070 repairs as well as an area to stockpile waste (as part of pad base material). Photo taken June 13, 2018 looking south.

