

**ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS  
GEOHAZARD ASSESSMENT PROGRAM  
NORTH CENTRAL REGION – ATHABASCA &  
FORT MCMURRAY DISTRICTS  
2023 SITE INSPECTION**



Site Number	Location	Name	Hwy	km
NC089	On the backslope of Hwy 63 to the south of King Street Interchange in Fort McMurray	Beacon Hill Backslope Slide	63:11	8.7
Legal Description		UTM Co-ordinates (NAD 83)		
SW-10-89-09-W4M		12 N 6284132.65	E	478495.60

	Date	PF	CF	Total
<b>Previous Inspection:</b>	June 24, 2021	11	3	33
<b>Current Inspection:</b>	May 17, 2023	11	3	33
<b>Road WAADT:</b>	27,390	<b>Year:</b>	2022	
<b>Inspected By:</b>	José Pineda, Tarek Abdelaziz (Thurber) Kristen Tappenden, Arthur Kavulok (TEC)			
<b>Report Attachments:</b>	<input checked="" type="checkbox"/> Photographs <input checked="" type="checkbox"/> Plans <input type="checkbox"/> Maintenance Items			
<b>Primary Site Issue</b>	An active landslide toeing out immediately above the highway west ditch but not currently impacting the highway (2016 lower landslide block)			
<b>Dimensions:</b>	About 75 m wide along the highway alignment and 55 m long perpendicular to the highway alignment (southern half of a 140 m wide ancient lower landslide block)			
<b>Site History:</b>	<p>Beacon hill has experienced extensive landslide activities in ancient times. Multiple dormant landslide blocks are visible in the slopes above the highway alignment.</p> <p>Landslide movements occurred within the hill above Hwy 63 at other locations in the past. Previous backslope repairs consisted mainly of slope regrading and drainage improvement. The northern half of the 2016 landslide is the vicinity of the southern flank of a repaired landslide.</p> <p>This landslide was first noted after the 2016 wildfire. The landslide grew bigger in size between 2016 and 2017.</p> <p>Geotechnical instruments were installed during the winter of 2018.</p>			
<b>Observations:</b>	<b>Description</b>			<b>Worse?</b>
<input checked="" type="checkbox"/> Slope Movement	2016 landslide block: 2 m deep and 2.0 m wide exposed head scarp crack; tilting trees; distinct toe roll (1.5 m high) located 9.5 m away from the edge of the highway			<input type="checkbox"/>
<input checked="" type="checkbox"/> Seepage	Typical zones of standing water and seepage areas were dry during the current inspection			<input type="checkbox"/>
<input checked="" type="checkbox"/> Other	Vegetation grew within the landslide mass; sink hole developed in 2020 approximately 20 m north of the landslide toe was not visible; severe erosion developed at the inlet of the C6 pipe was not visible; garbage was noted at the inlet of culvert C6			<input type="checkbox"/>

**Instrumentation: (2SIs, 14PNs)**

SI17-2, located within the local landslide block, showed a rate of movement of 0.3 mm/yr over 4.8 m to 7.3 m depth between the spring of 2022 and the spring of 2023. SI17-7, located in the upper landslide block, also showed a rate of movement up to 0.2 mm/yr at a depth of 22.9 m to 24.1 m since the previous readings.

Pneumatic piezometers PN17-1A, PN17-2B, PN17-3A, PN17-5A, PN17-7C showed increases in groundwater levels of ranging between 0.05 m to 1.26 m since the piezometers were last read in the spring of 2022. Pneumatic piezometers PN17-1B, PN17-2A, PN17-3B, PN17-4, PN17-5B, PN17-6A, PN17-6B, PN17-7A, and PN17-7B showed decreases in groundwater ranging from 0.1 to 2.76 m since they were last read in the spring of 2022.

**Assessment (Refer to attached Figures):**

The site condition remained relatively unchanged since the 2021 site inspection visit.

Based on current site observations and instrumentation readings, the landslide appears to have generally become more stable over the past few years likely due to progressive growth of vegetation and reduction of groundwater levels over time. However, previous readings of instrumentation within the landslide mass (including sheared off/blocked slope inclinometers) indicated that the 2016 landslide block was moving at high rates between the spring and the fall seasons due to the increase in groundwater level during this period. Hence, an abrupt movement could still take place as previously occurred in response to loss of vegetation and/or elevated groundwater levels within the colluvium deposits.

If an abrupt movement of the landslide takes place, the landslide debris will likely accumulate in the highway ditch and impede surface drainage.

**Recommendations:**

The site condition remained relatively unchanged for a few years, and therefore this site can be temporarily removed from the geohazard inspection program.

The operational instruments should however be read at least once a year.

The landslide should be regularly monitored by the local MCI, particularly after a prolonged rainfall event, and the ditch bottom should be touched to be cleared of the landslide debris as needed (without significantly changing grades) to improve surface water drainage. Excavated landslide debris (if any due to future movement) from the highway ditch should be pushed back into the toe of the slope.

Permanent repairs are not anticipated at this site unless the landslide becomes very active, and starts impacting the highway.

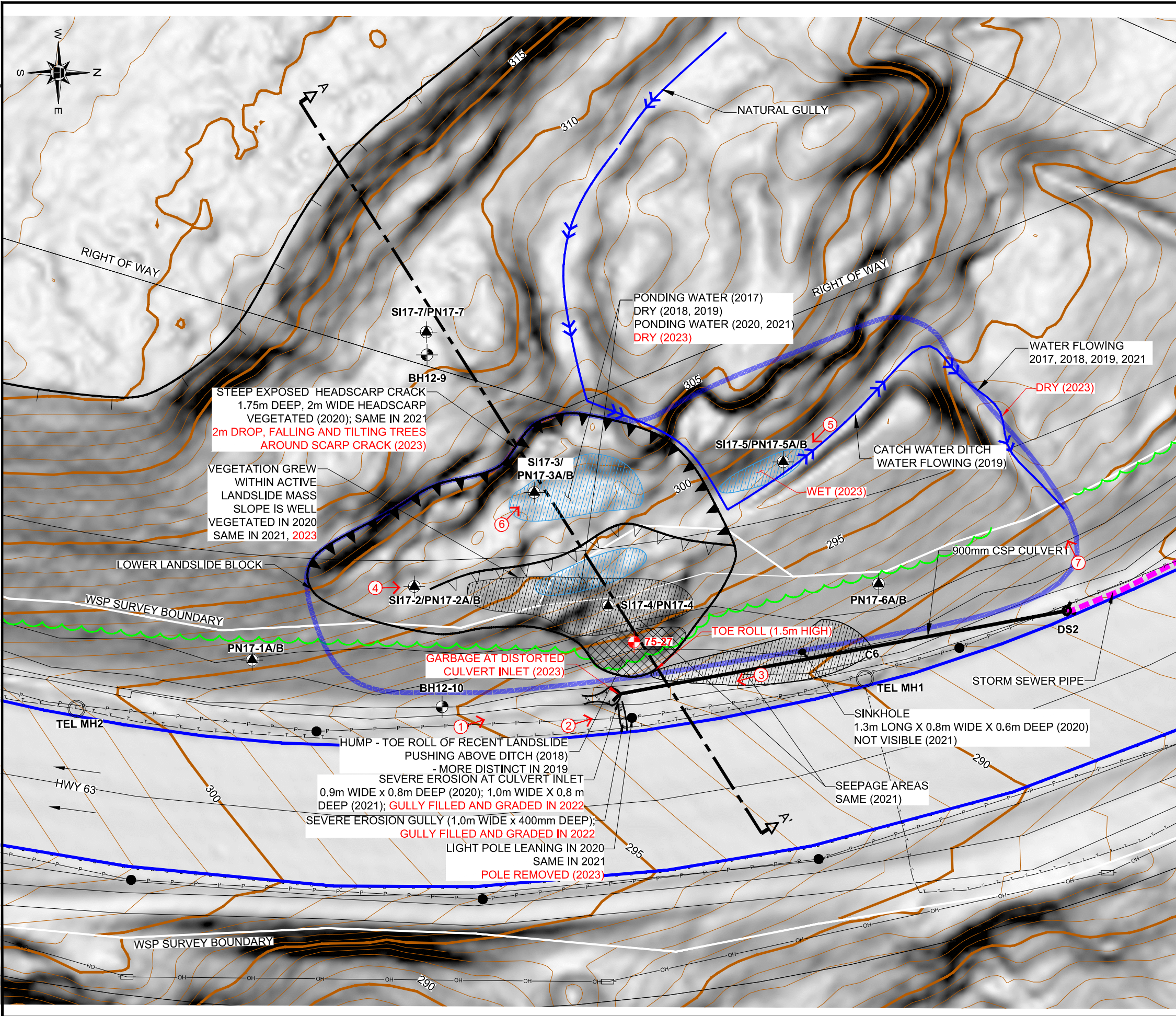
**Closure**

It is a condition of this letter report that Thurber's performance of its professional services will be subject to the attached Statement of Limitations and Conditions.

Yours very truly,  
Thurber Engineering Ltd.  
Tarek Abdelaziz, Ph.D., P.Eng.  
Principal | Geotechnical Review Engineer

José Pineda, M.Eng., P.Eng.  
Associate | Senior Geotechnical Engineer

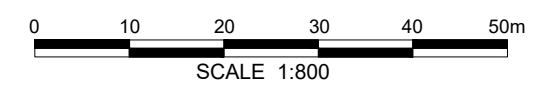
H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\ICAD\2023 GEO HAZARD\UGP\32122 NC089-1-1-2.dwg - 1 - Jun. 07, 2023



**LEGEND**

- APPROXIMATE LOCATION OF SLOPE INCLINOMETER (SI) / PNEUMATIC PIEZOMETER (PN)
- APPROXIMATE LOCATION OF PREVIOUS TEST HOLE
- HEADSCARP CRACK
- TENSION CRACK
- APPROXIMATE BOUNDARY OF ANCIENT LANDSLIDE BLOCK (LIDAR)
- APPROXIMATE BOUNDARY OF RECENT ACTIVE LANDSLIDE (SOUTHERN HALF OF ANCIENT BLOCK)
- APPROXIMATE VALLEY CREST
- TREE LINE
- GUARDRAIL
- OVERHEAD POWER LINE
- UNDERGROUND POWER LINE
- UNDERGROUND TELUS CABLE
- LIGHT STAND
- TELUS MANHOLE
- POWER POLE
- DROP STRUCTURE (DS#)
- STANDING WATER
- WATER FLOW
- PHOTOGRAPH NUMBER, AND APPROXIMATE DIRECTION AND LOCATION

- NOTES:**
1. LIMITED SURVEY IN THE VICINITY OF THE HIGHWAY WAS CONDUCTED ON AUGUST 30, 2017 BY WSP.
  2. BACKSLOPE CONTOURS ARE BASED ON 20016 LIDAR DATA.
  3. **MAY 17, 2023 OBSERVATIONS ARE SHOWN IN RED.**
  4. GRADING WORK TO INSTALL THE INSTRUMENT IN THE WINTER OF 2018 MASKED LANDSLIDE FEATURES.



*Alberta*

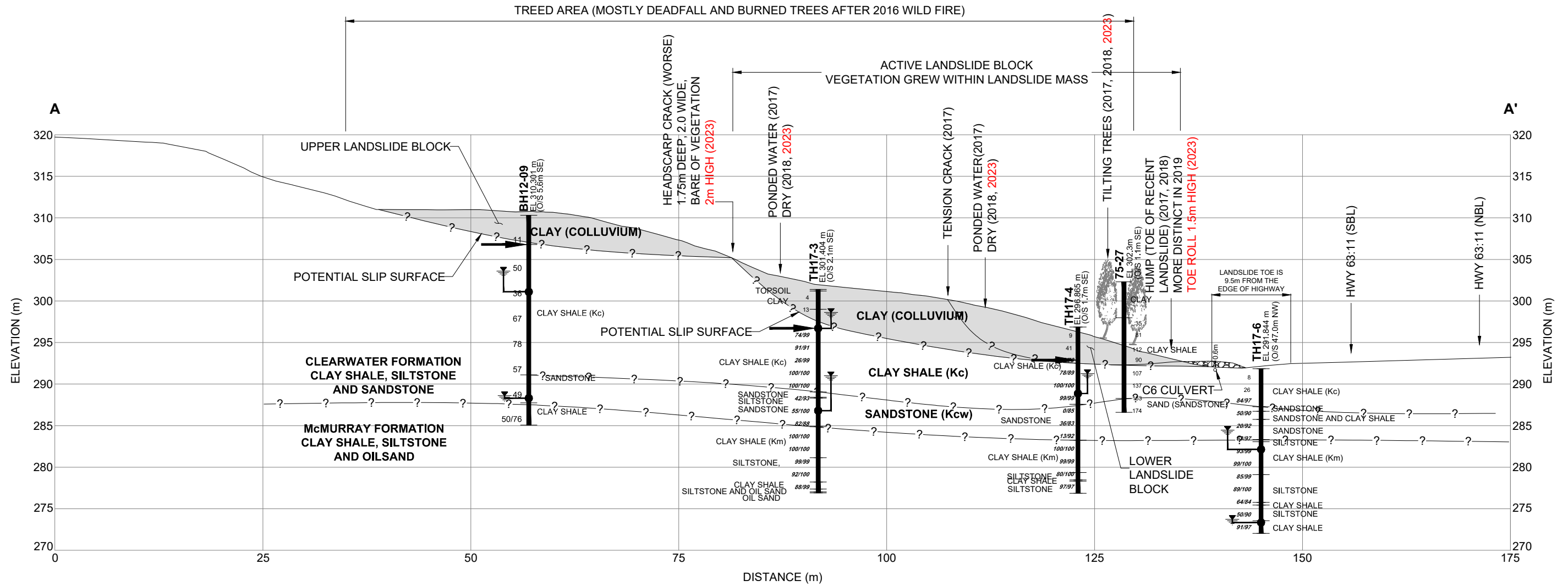
**NORTH CENTRAL REGION  
(ATHABASCA AND FORT McMURRAY DISTRICTS)  
2023 GEOHAZARD ASSESSMENT**

**NC089: HWY 63:11 BEACON HILL  
BACKSLOPE SLIDE (km 8.7)  
SITE INSPECTION PLAN**

**FIGURE 1**

DRAWN BY	ML
DESIGNED BY	JGP
APPROVED BY	TSA
SCALE	1:800
DATE	JUNE 2023
FILE No.	32122

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**LEGEND**

- RQD / RECOVERY %
- SPT N VALUE
- WATER LEVEL IN PIEZOMETER (OCTOBER 18, 2017 AND FEBRUARY 21, 2018)
- PNEUMATIC PIEZOMETER TIP
- POTENTIAL ZONE OF MOVEMENT IN SLOPE INCLINOMETER

**NOTE:**


1. CROSS-SECTION A-A' IS BASED ON THE 2016 LIDAR DATA.
2. MAY 17, 2023 OBSERVATIONS ARE SHOWN IN RED.



**NORTH CENTRAL REGION  
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2023 GEOHAZARD ASSESSMENT  
NC089: HWY 63:11 BEACON HILL  
BACKSLOPE SLIDE (km 8.7)  
CROSS - SECTION A - A'**

**FIGURE 2**

DRAWN BY	ML
DESIGNED BY	JGP
APPROVED BY	TSA
SCALE	1:500
DATE	JUNE 2023
FILE No.	32122



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**Photo 1. Looking north at the toe of the landslide; the landslide is toeing out above the ditch near culvert C6**



**Photo 2. Previously noted erosion gully, downslope of the toe of the landslide at culvert inlet location, was filled and graded. Note garbage accumulation at the culvert inlet**



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**Photo 3. Looking south at the toe of the landslide; note tilting trees within the landslide mass**



**Photo 4. Looking south at the toe of the landslide; note tilting trees within the landslide mass.**



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**Photo 5. Looking south at catch water ditch near SI17-5. Ground was wet but no water ponding in 2023.**



**Photo 6. Looking northwest at backscarp; note cattails and lush vegetation due to seepage near SI17-3.**





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**Photo 7. Looking west at the northern flank of the lower ancient landslide block |**